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## NPA's Committee on Changing International Realities and Their Implications for U.S. Policy

Profound changes have been taking place during the 1970s in the nature of the international political and economic system and in the position of the United States within it. These continuing developments involve new and highly complex kinds of interactions among nations. In consequence, many of the assumptions about international economic and political relationships that were relevant during the 1950s and '60s can no longer serve as valid bases for governmental and private policy making. Today and for the future, policy makers need new concepts and data relevant to the changing realities of the present period if they are to serve the interests of the United States and the welfare of the American people. And, because the United States has a predominantly private enterprise economy, policies affecting the ability of the U.S. private sector to function effectively both at home and abroad are of crucial importance for realizing these national goals.

Accordingly, in 1975, NPA established the Committee on Changing International Realities and Their Implications for U.S. Policy (CIR) to undertake a continuing two-part program. It consists of (1) research on the nature and probable future development of the new international realities and of U.S. capabilities and needs relative to them, and (2) based on these analyses and forecasts, suggestions for governmental and private policies to improve the international performance of the U.S. economy so that it can better protect and advance the interests of the United States and the well-being of the American people.

In accordance with NPA's practice, the CIR consists of experienced leaders from the main private-sector groups: business corporations and banks, labor unions, farm organizations, and the professions. The Committee meets twice a year to discuss subjects to be researched, to review outlines and drafts of studies under way and to consider their policy implications. Detailed guidance of the CIR's research program is carried on by subcommittees concerned with various subject areas. Professional and administrative staff services are provided to the Committee under the supervision of the Director of NPA's International Division.

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# THE IMPACT OF INFLATION

## on U.S. Productivity and International Competitiveness

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NPA Committee on
Changing International Realities

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by Michael J. Boskin, Mark Gertler and Charles Taylor


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# A Statement by the Committee on Changing International Realities

One of the most important new realities of the 1980s is the increasingly critical nature of the relationship between productivity and competitiveness. The general decline in the rate of growth of U.S. productivity over the last decade threatens to undermine the international competitiveness of the United States in many industries.

While this relationship has received much attention of late, and there has developed considerable understanding of the direct mechanisms that connect productivity to competitiveness, there has been far less progress made toward a satisfactory analysis of the impact of inflation on the productivity/competitiveness relationship. There is a tendency to think of the increase in inflation of the last five years and the deceleration in productivity growth as separate domestic problems, and the rising threat to U.S. competitiveness abroad as a separate problem for our international economic policies. In fact, to manage the problems of inflation, productivity and competitiveness in the 1980s, it is necessary to base policy on an understanding of how they interact. Accordingly, NPA's Committee on Changing International Realities has commissioned this study of *The Impact of Inflation on U.S. Productivity and Competitiveness* as the fourth in its ongoing series of studies on U.S. international competitiveness.

The study argues that inflation affects productivity and competitiveness in three basic ways. First, the business environment becomes more uncertain as inflation accelerates and, consequently, there tends to be less investment and innovation than otherwise. Second, inflation increases effective tax rates, adversely affecting the incentives to save, to invest and to work. Third, and most direct, inflation raises the prices of U.S. goods in international markets. This may be offset by exchange-rate changes, although, as has happened, the Federal Reserve Board may raise interest rates and this can prevent the exchange rate from falling.

The authors conclude that much could be done by reforming the tax codes for private individuals and for corporations to reduce the detrimental effects of inflation. This is not to say that bringing inflation under control should not remain a very high priority for this and subsequent administrations to address. But, as the authors note, some of the reforms recommended here could in fact help control inflation. In the meantime, policy changes that minimize the adverse impact of inflation are needed.

The Committee does not necessarily support all of the recommendations drawn up at the end of this study. However, it does support the general tenor of the conclusions: that the consequences of high inflation for U.S. productivity and competitiveness are serious and need urgent attention. The main body of the text is valuable for the substantial amount of information drawn together and synthesized. This analysis should, we hope, contribute significantly to the continuing debate

among opinion leaders and policy makers about ways to mitigate the effects of inflation. Therefore, the Committee on Changing International Realities is pleased to recommend that this study be published as a report signed by the authors.

## Footnotes to the Statement

I commend the authors for an excellent analysis of these complex and serious economic problems, and I support the philosophy and direction of their "Conclusions for Policy." Support of any individual policy measure would, of course, depend on the specific details for the measure and on the context in which it is proposed. —**James E. Lee**

Given the importance of technological change in economic growth and development, the omission of an R&D tax credit is serious. I recommend its addition to the list of economic policy initiatives advocated by the authors.

R&D is the catalyst that makes step-function productivity gains possible. According to Professor Kendrick of George Washington University, roughly two-thirds of all advances in managerial and technological knowledge (which, in turn, account for roughly one-half of the U.S. increases in productivity between 1948–78) stem from formal programs that increase the stock of R&D. Texas Instruments' experience has confirmed that money invested in R&D is highly leveraged in its beneficial effect on productivity and price reduction.

Texas Instruments Incorporated sponsored a study, prepared by Andrew Brimmer in cooperation with Data Resources Inc., which demonstrates the positive impact of alternative R&D tax credits (10 percent, 25 percent, 50 percent) on industrial R&D expenditures, productivity and real GNP growth. The study showed that the enactment in 1966 of a continuing 25 percent tax credit on industrial R&D expenditures would have generated, in 1972 dollars, an additional $2 billion per year in R&D outlays during 1966–77, an additional $5 billion per year during 1978–87, and an additional $11 billion per year during 1988–97. Subsequently, this increase in R&D spending would have boosted productivity and real economic growth. During 1966–77, R&D spending would have added 0.2 percentage points to annual productivity gains. During 1978–87, 0.3 percentage points would have been added, and during 1988–97, 0.4 percentage points would have been added. Real GNP growth would have increased over the three 10-year periods by approximately $4 billion, $36 billion and $102 billion, respectively. These results indicate that the R&D tax credit is an investment that would yield significant positive returns to society as well as to private firms.

While this study on *The Impact of Inflation* has extensively investigated the ways in which inflation weakens the economy, it has made no attempt to identify the sources of inflation. In view of the fact that excessive monetary growth and recurring federal government deficit spending are widely recognized to be the primary sources of inflation, responsible fiscal and monetary policies should be at the top of any list of economic policies designed to deal effectively with inflation. —**Mark Shepherd, Jr.**

While I agree with the general tenor of the conclusions of this study, that the consequences of high inflation for U.S. productivity and competitiveness are serious, I believe that the inflation problem should be solved by appropriate monetary and fiscal policy. Structural changes such as indexing and VAT should be debated on their own merits of resource allocation rather than on their usefulness in accommodating sustained inflation.

Indexing may not result in a better allocation of resources because it likely would lead to more variability in the inflation rate. The improved investment incentives from indexing, for example, then must be weighed against the disincentives (discussed by the authors at several parts in the report) of more uncertainty generated by potentially greater variability in the inflation rate. Furthermore, the authors' proposal to index the income tax when the transfer system is indexed would seem to lead to larger budget deficits (as in the Canadian example in the text), a major source of the inflation problem. —**Mark H. Willes**

At present, I do not support the introduction of a value-added tax as a partial substitute for income taxes. Introducing a value-added tax would sharply increase the consumer price index. Under the escalation provisions governing many wage and pension contracts, including those affecting public employees, this would automatically trigger large increases in wage and benefit costs. This would be undesirable on several grounds. Those individuals benefiting from such escalation provisions would be spared the burden of value-added taxes which would fall on others not so fortunately situated. Moreover, the inflationary impact of the tax would inevitably be excessive.

Neither do I think that a personal expenditure tax as a substitute for income taxes would be practical either in terms of attracting the necessary political support for passage or as a matter of efficient tax administration. —**Howard Bell** *(see pp. 57–58 of text)*

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*See footnotes to the Statement

# Introduction

In the last decade, the United States experienced an unprecedented period of continual inflation. Between 1970 and 1979, the wholesale price index increased by an average of over 8 percent each year, and in 1980 it is likely to exceed this rate. Yet, by standards of other countries, such as Brazil or even the United Kingdom, this inflation was quite modest. However, the United States has been left substantially behind many other countries in adapting to the economic distortions induced by this sustained inflation.

As the new decade begins, the inflation rate in the United States, as in most Western industrialized nations, appears to be accelerating, despite federal government efforts to bring it down. It seems likely that, even if present anti-inflationary policies meet with some success, inflation will continue to be quite high. It is therefore very timely to explore ways to minimize the impact of inflation on productivity and competitiveness. This is the objective of the present study.

More specifically, by reviewing the situation in the United States and comparing it with those of a sample of other economies, this report seeks to identify lessons for U.S. policy. Accordingly, a large part of the study is devoted to a review of the experience over the last 10 to 20 years of inflation in the United States. This is preceded by an overview that considers some of the general issues and makes some direct international comparisons with Canada, the United Kingdom, Brazil, Japan, Germany, and France. Then, there are three short chapters that review aspects of indexing and adjusting for inflation in Canada, the United Kingdom and Brazil. The final chapter briefly summarizes the study's conclusions for policy in the United States.

# Overview 1

## GENERAL CONSIDERATIONS

Inflation affects productivity and competitiveness in a variety of ways. In each instance, price distortions lead relative market prices away from the real costs of providing a service or product and the real benefits of using it. This is so, for example, in the case of interest rates. If, because of direct legislation, or tax or monetary policies, interest rates do not rise to maintain net real rates of return as inflation increases, then the cost of borrowing and the return to saving both fall away from their true values to the economy. This example illustrates the second element that must be present for moderate inflation to lead to market distortions, namely, institutions whose policies do not reflect the reality of continuing inflation.

Thus, the impact of inflation on productivity and competitiveness can be discussed by considering the distortionary effects of inflation on: (1) personal income and expenditure; (2) the behavior of the firm and its investment and finance decisions; (3) the behavior of government; and (4) trade, especially inflation's direct impact on it.

Inflation may narrow or broaden the distribution of income. Those concerned with inequity are legitimately preoccupied with the possibilities that the poor on fixed incomes may suffer from inflation or that the rich, who can shelter their wealth, may benefit from it. But for those concerned with productivity, the opposite effects are more worrisome. It can be argued with some force that reductions in aftertax real disposable income differentials generally act as a disincentive to work in more skilled or demanding occupations or to work harder in a given occupation. This can occur if progressive income tax brackets are fixed in nominal terms, if wage policy sets an upper limit on pay increases that is unrelated to income levels, or if unemployment benefits, social security and other transfer payments are indexed in such a way that they rise faster than net wages.

Inflation may also influence the choice between consumption and saving. If the real return to saving has fallen considerably, as is the case in the United States, the incentive to save is substantially reduced. The real return has certainly been negative for many small savers in this country during most of the 1970s. Switching to taxes on consumption—sales, value-added or personal expenditure taxes—could reduce the incentive to consume and thereby somewhat offset the effect of low interest rates on savers. However, it would still be unreasonable that deferring consumption should be penalized and entering into debt encouraged.

As long as real interest rates are suppressed, it is obviously wise for firms as well as individuals to lever their financing as much as possible, even though this is undesirable for the economy as a whole in that borrower and equity holder vulnerability increases and equity holder commitment is diluted. But a firm's

finances and investment decisions are perhaps more seriously affected by other aspects of inflation. Because depreciation allowances are based on the historic cost of assets, beforetax profits must be higher to finance asset replacement or aftertax rates of return will decline. A firm must earn greater profits to cover the tax on capital gains due to inflation as well as the tax on the real gain in equity value. As a result, there are fewer resources available for investment, and productivity is likely to suffer in the long run.

Inflation may also increase the uncertainty surrounding an investment and thereby act as a disincentive to the expansion of existing firms or the creation of new ones. This occurs when there is greater relative price uncertainty as a result of a given expected rate of inflation. Uncertainty about the rate of inflation itself may decrease risk-taking as inflation rises; shorter gestating investments certainly become more attractive.

While inflation has changed the economic environment for individuals and firms, it has posed policy problems for governments. The solutions have never been easy since there has been a rough tradeoff between reduced inflation and reduced unemployment. Now, however, the relationship appears to be weakening, and it is unclear that even severe austerity could restore stable prices. For this reason, policies that reduce the distortionary effects of inflation warrant serious consideration.

In principle, it can be argued that controlling inflation, even when it reaches annual rates of 20 or 30 percent, is unnecessary. The policies advocated in this study, combined with others that also attempt to offset the inequities inflation creates, might well reduce the costs of inflation below the costs of a temporary recession. In practice, however, inflation rates are unstable, and the chance of an unmanageable hyper-inflation of the kind that paralyzed Germany in the 1920s seems greater when the rate is running in the range of 20 or 30 percent than when it is comfortably below, say, 5 percent per annum. Price uncertainty also increases with inflation and inhibits business activity. Thus, bringing down the inflation rate remains the first priority even though there are policies available to offset its more persistent deleterious effects.

While inflation creates a policy problem, it is also the source of a significant indirect benefit for many governments of the Organization for Economic Cooperation and Development. The progressivity of personal income taxes and the inflationary taxes on equities and corporate financing tend to cause government revenues to rise more quickly than inflation itself. It is, in a sense, taxation without representation in that spending can expand and the government's share of the gross national product can rise without legislative approval of higher tax rates. Thus, inflation and inflationary taxation can directly reduce incentives to maintain productivity in the business and household sectors and, at the same time, indirectly accommodate increases in government spending.

Finally, inflation can directly affect international competitiveness by the simplest of all means, namely, by leading to prices too high for the market. If foreign exchange rates are fixed for a period and the general rate of inflation is higher in one country than another, then products and services from the first country will gradually grow less competitive relative to those from the second country in both domestic and foreign markets. While floating exchange rates can in principle

**TABLE 1-1. TRENDS IN INFLATION RATES, 1950-79: INTERNATIONAL COMPARISONS**
**(Average Annual Percent)**

| | U.S. | Japan | Germany | France | Brazil | U.K. | Canada |
|---|---|---|---|---|---|---|---|
| 1950-59 | 1.50 | 2.21 | 2.03 | 5.02 | 19.84 | 2.90 | 1.75 |
| 1960-70 | 1.51 | 1.29 | 1.32 | 2.85 | 41.98 | 3.33 | 1.78 |
| 1971 | 3.33 | – 0.78 | 4.34 | 2.09 | 19.99 | 9.06 | 2.04 |
| 1972 | 4.45 | 0.79 | 2.60 | 4.68 | 18.59 | 5.21 | 4.30 |
| 1973 | 13.07 | 15.83 | 6.58 | 14.66 | 16.77 | 7.41 | 11.19 |
| 1974 | 18.83 | 31.39 | 13.42 | 29.11 | 29.15 | 22.79 | 19.07 |
| 1975 | 9.29 | 2.99 | 4.71 | – 5.66 | 27.24 | 22.10 | 11.23 |
| 1976 | 4.06 | 5.10 | 3.90 | 7.40 | 43.38 | 17.30 | 5.10 |
| 1977 | 6.12 | 1.81 | 2.60 | 5.59 | 42.40 | 19.78 | 7.90 |
| 1978 | 7.84 | – 2.52 | 1.31 | 4.23 | 37.56 | 9.11 | 9.17 |
| 1979 | 12.45* | 7.39 | 5.00 | 13.21 | 55.91 | 12.13 | 14.16 |
| 1970-79 | 8.78 | 6.89 | 4.94 | 8.35 | 32.09 | 13.88 | 9.34 |

*The CPI rose 7.5 percent in 1979; the series shown here is the wholesale price index for the United States.
Sources: *IFS Yearbook*, 1979, movements in wholesale or industrial goods price indices; *Bank of Canada Review*, various issues; monthly *IFS*, March 1980.

totally offset differences in inflation rates, they may not do so in fact because the exchange rate is also subject to influence from transactions on the capital account in the balance of payments. For the United States, this has been a particularly important consideration since the Second World War because of the dollar's role as a reserve currency and as the dominant multilateral medium of exchange. U.S. prices, adjusted for exchange-rate changes, have not quite remained in line with those of its trading partners and, perhaps surprisingly, this drift has generally been to the advantage of U.S. business. (See the discussion in Chapter 2 on "Inflation, Competitiveness and Trade.")

## INTERNATIONAL COMPARISONS

In this section, comparisons are made between the United States and five of its main trading partners: Japan, Germany, France, the United Kingdom, and Canada. Brazil is discussed as an example of a country with very rapid inflation rates.

There were some similarities in the course of inflation in these seven countries over the last three decades (see Table 1-1). With the exception of France in the 1950s, inflation rates averaged less than 3.5 percent per annum between 1950 and 1970 in every OECD country considered here. Over the whole 20-year period, U.S. inflation was the lowest. Brazil stands out as having had rates of inflation which were astronomic by comparison: an average annual rate of 19.8 percent in the 1950s and 42.0 percent in the '60s. In the 1970s, inflation rates in the OECD countries accelerated, peaking in 1974. France, Germany and Japan subsequently brought their rates back down to their pre-1970 levels; the United States, the United Kingdom and Canada failed to do so. In 1979, inflation accelerated once again in the OECD countries. The inflation rate in Brazil peaked later than in these six countries and, in fact, barely began to decline before once more accelerating in 1979.

These inflationary pressures had a serious impact on real interest rates, measured as the average yield on long-term government securities minus the increase in the wholesale price level (see Table 1-2). In the 1950s and '60s, real interest rates were on average positive in all seven countries. With the exceptions of Canada and Germany in the 1960s, when rates averaged 8.8 percent and 5.4 percent, respectively, real interest rates averaged between 0.7 and 3.8 percent over these two decades. In the 1970s, real interest rates were very unstable, although Germany remained exceptional in this period also, managing to keep real interest rates between 2.4 and 5.3 percent in every year except 1974. For the period as a whole, real interest rates were on average positive in France, Germany and Japan, whereas in the United States, the United Kingdom, Canada, and Brazil they were on average negative.

Over such long periods, real interest rates almost certainly influenced the rate of saving and investment in the seven countries, but there were other influences at work too (see Table 1-3). Looking at investment as a percentage of the gross domestic product, the pattern that emerged had two dominant features: (1) Japan, Germany, France, and Brazil consistently invested more of their GDP than the United States, the United Kingdom or Canada; and (2) investment rates in the 1970s peaked in 1973 and 1974 across the board with the exception of Germany, which peaked earlier.

Positive real interest rates in France, Germany and Japan may have stimulated saving, and the fact that these economies were reconstructing their industrial capacity following the destruction of the Second World War may have meant that the real return to investment was also high in these countries. The observed decline in investment rates after 1974 could be explained as a secular phenomenon, brought on by the decline in investment opportunities, on the one hand and, on the other, a weakening of the precautionary motive for saving brought on by the greater security affluence brings. Alternatively, it may be that the decline reflects an attempt to maintain growth rates of consumption, despite the shock to production sustained after the first oil crisis.

Another predicted effect of inflation is that government expenditures should increase faster than GNP (see Table 1-4). Between 1970 and 1979, central government expenditures increased as a percentage of GNP in every country except Germany (Table 4a). The increase in France was very small and, perhaps surprisingly, next smallest in the United States. The data for all levels of government (Table 4b), for which a shorter time series is available, suggest that when inflation increased rapidly in 1975, government expenditures generally increased. Thereafter, they were held in check. The underlying cause for this surge was probably the increase in transfer payments. Government tax revenues as a percentage of GDP also showed some increase (Table 4c), rising by between 3 and 7 percentage points from 1973 or 1974. Thus, although revenues may have risen in part to accommodate increases in expenditures, the evidence is consistent with the view that they may have increased automatically as a result of the interplay between the tax structure and inflation.

It may be possible to explain some of the differences in these rates of increase by examining the structure of tax revenues. One hypothesis is that in countries with higher than average rates of increase in government expenditure of revenue, those taxes which automatically capture inflationary increases, or more than those increases, will account for a higher proportion of revenues than average. There is certainly a great variety of tax revenue structures (see Table 1-5). However, income taxes and corporate profits taxes, which might be thought of generally as yielding real revenue gains through inflation, are high in the United States, Canada and the United Kingdom and low in France and Germany, whereas France, Germany and the United Kingdom were the countries with the rapid increases in government expenditures. However, Germany and France and, to a lesser extent, the United Kingdom, have high proportions of tax revenue derived from sales and value-added taxes. These taxes are generally *ad valorem* rather than specific taxes and thus are at least inflation protected. In general, Table 1-5 is inconclusive about the importance of taxes that automatically yield real revenue gains through inflation.

What impact have these many diverse factors had on productivity? Once again, it is possible to observe various suggestive relationships, but a degree of caution is in order in ascribing productivity changes to inflationary causes (see Table 1-6). The most striking relationship from the 1950s to the '70s was between productivity trends and rates of investment (see Tables 1-3 and 1-6). The lower the percentage of GNP spent on investment, the lower the rate at which productivity increased. While the United States had the highest level of productivity in the world in the 1950s, this rate did not increase nearly as fast as those in Germany, France and Japan. Japanese productivity gains were clearly related to their very high rates of investment.

**TABLE 1-4. GOVERNMENT EXPENDITURES AND REVENUES AS A PERCENTAGE OF GNP OR GDP**

| | U.S. | Japan | Germany | France | Brazil | U.K. | Canada |
|---|---|---|---|---|---|---|---|
| **4a Central Government Expenditures/GNP** | | | | | | | |
| 1950 | — | — | — | 24.5 | — | 24.6 | 15.9 |
| 1960 | 18.2 | 15.3 | 42.1 | 23.4 | 12.0 | 27.1 | 15.5 |
| 1970 | 20.6 | 9.9 | 28.7 | 21.1 | 9.7 | 30.7 | 18.7 |
| 1979 | 21.1[e] | 13.6 | 14.7 | 21.5[a] | 14.9[a] | 39.4[e] | 20.8[e] |
| Percentage increase | | | | | | | |
| 1970–79 | 2.4 | 37.6 | – 48.8 | 1.7[b] | 54.3[b] | 28.3 | 11.2 |
| **4b Total Government Expenditures/GNP** | | | | | | | |
| 1974 | 31.4 | 25.0 | 45.5 | 41.0 | 28.5 | 50.9 | 43.3 |
| 1975 | 34.7 | 15.0 | 48.8 | 44.3 | 30.8 | 53.8 | 47.2 |
| 1976 | 34.5 | 15.5 | 46.9 | 44.5 | — | 50.3 | 44.8 |
| 1977 | 33.1 | 16.4 | 46.7 | 43.5 | — | 47.1 | 43.9 |
| 1978 | — | — | — | 44.4 | — | 47.0 | — |
| **4c Total Tax Revenues/GDP** | | | | | | | |
| 1965 | 26.5 | 18.1 | 31.6 | 35.0 | — | 31.0 | 25.9 |
| 1970 | 30.1 | 19.5 | 32.8 | 35.4 | — | 37.9 | 32.0 |
| 1971 | 28.8 | 19.4 | 33.2 | 35.0 | — | 35.6 | 31.2 |
| 1972 | 29.6 | 20.2 | 34.7 | 35.3 | — | 34.4 | 31.8 |
| 1973 | 29.7 | 21.7 | 36.3 | 35.5 | — | 32.6 | 31.5 |
| 1974 | 30.2 | 22.2 | 36.3 | 35.8 | — | 36.0 | 34.2 |
| 1975 | 30.2 | 20.2 | 35.8 | 37.5 | — | 36.9 | 33.1 |
| 1976 | 29.3 | 20.9 | 36.7 | 39.5 | — | 36.7 | 32.9 |

e = estimates

[a]1978.

[b]1970–78.

Sources: 4a: *IFS Yearbook*, 1979.
4b: *IFS Yearbook*, 1979, and IMF, *Government Finance Statistics Yearbook* (Vol. III, 1979).
4c: *OECD Revenue Statistics, 1965–76*, 1978.

**TABLE 1-2. TRENDS IN REAL INTEREST RATES, 1950-79: INTERNATIONAL COMPARISONS (Average Annual Percent)**

| | U.S. | Japan | Germany | France | Brazil | U.K. | Canada |
|---|---|---|---|---|---|---|---|
| 1950-59 | 1.50 | n.a. | n.a. | 0.67 | 2.00 | 1.50 | 3.66 |
| 1960-70 | 3.30 | n.a. | 5.43 | 2.99 | 3.82 | 3.53 | 8.77 |
| 1971 | 2.79 | 8.06 | 3.66 | 5.65 | 0.01 | – 0.16 | 4.91 |
| 1972 | 1.56 | 5.91 | 5.30 | 2.67 | 1.41 | 3.70 | 2.93 |
| 1973 | – 5.95 | – 8.57 | 2.72 | – 6.41 | 1.23 | 3.31 | – 3.63 |
| 1974 | – 10.77 | – 22.13 | – 3.02 | – 18.62 | – 11.15 | – 8.03 | – 10.17 |
| 1975 | – 1.10 | 6.21 | 3.79 | 15.15 | – 9.24 | – 7.71 | – 2.19 |
| 1976 | 3.81 | 3.62 | 3.90 | 8.42 | – 15.38 | – 2.87 | 4.08 |
| 1977 | 1.55 | 5.52 | 3.60 | 4.02 | – 12.40 | – 7.05 | 0.80 |
| 1978 | 0.65 | 8.61 | 4.49 | 4.73 | – 4.56 | 3.36 | 0.13 |
| 1979 | – 3.12[a] | 0.30 | 2.40 | n.a. | n.a. | 0.86 | – 3.90 |
| Arithmetic average 1971-79 | – 1.17 | 0.83 | 3.47 | 1.95[b] | – 6.26[b] | – 1.62 | – 0.78 |

n.a. = not available.

[a]Using the CPI rather than the wholesale price index would yield a positive rate of 1.33 percent.

[b]Average for 1971 to 1978.

Note: Estimated by comparing the average yield on long-term government securities with the industrial goods or wholesale price index movement. For Brazil, the discount rate rather than the government bond yield was used.

Sources: *IFS Yearbook*, 1979, and monthly *IFS*, March 1980.

**TABLE 1-3. INVESTMENT AS A PERCENTAGE OF GDP, 1950-79: INTERNATIONAL TRENDS**

| | U.S. | Japan | Germany | France | Brazil | U.K. | Canada |
|---|---|---|---|---|---|---|---|
| 1950 | 21.6 | n.a. | 22.2 | 19.6 | n.a. | 11.5 | 23.2 |
| 1960 | 18.8 | 33.7 | 27.2 | 23.0 | 17.9 | 18.6 | 22.8 |
| 1970 | 18.4 | 38.8 | 27.9 | 26.1 | 23.5 | 19.6 | 20.8 |
| 1971 | 18.5 | 35.6 | 26.9 | 25.1 | 25.3 | 18.8 | 22.1 |
| 1972 | 19.3 | 35.4 | 26.3 | 25.5 | 25.5 | 18.6 | 22.1 |
| 1973 | 19.9 | 38.2 | 25.3 | 26.2 | 27.3 | 21.8 | 23.5 |
| 1974 | 18.6 | 37.3 | 22.5 | 26.7 | 31.6 | 22.1 | 25.2 |
| 1975 | 15.7 | 32.6 | 20.5 | 23.0 | 29.9* | 18.3 | 23.7 |
| 1976 | 17.1 | 31.6 | 21.6 | 24.5 | 28.0* | 19.6 | 23.8 |
| 1977 | 18.5 | 30.7e | 21.6 | 23.7 | 25.9* | 19.4 | 22.6 |
| 1978 | 19.2 | 30.7e | 22.1 | 22.6 | 26.2* | 19.0 | 22.5 |
| 1979 | 19.0e | 32.2e | 24.3e | n.a. | n.a. | 18.4e | 23.6e |

n.a. = not available.
e = estimates, based on adjusted GNP, as opposed to GDP, or on six or nine months of data.
*Estimated assuming an average proportion of increase in stocks to gross fixed capital formation of 18 percent (average of 1971-74).
Sources: *IFS Yearbook*, 1979, and monthly *IFS*, March 1980.

**TABLE 1-6. PRODUCTIVITY TRENDS: AVERAGE ANNUAL RATES OF CHANGE OF GNP DIVIDED BY CIVILIAN EMPLOYMENT, 1950-78 (Percent)**

| | U.S. | Japan | Germany | France | U.K. | Canada |
|---|---|---|---|---|---|---|
| 1950-60 | 2.30 | n.a. | n.a. | n.a. | n.a. | 3.01 |
| 1960-70 | 2.06 | 9.72 | 4.61 | 4.75 | 2.77 | 2.39 |
| 1970-78 | 1.05 | 4.60 | 3.38 | 3.56 | 2.04 | 1.73 |

n.a. = not available.
Sources: IMF; *IFS Yearbook*, 1979; and ILO statistics.

The second point is that the rate of productivity gain fell in every country in this group. In Germany, France and Japan, this is probably related to the decrease in the investment rate and the slower rise in the capital/labor ratio.

Third, the rates of productivity increases in Germany, France and Japan were still much higher than the rates in the United States, the United Kingdom and Canada. Germany and France have a much lower dependency on individual income taxes and corporate profits taxes than the United States, Canada or the United Kingdom (see Table 1-5). Moreover, Germany and France are far more dependent on consumption taxes (sales and value-added taxes), suggesting that, through the structure of taxes, they offer more incentive to save than to consume. This may be an important factor in explaining their higher rates of productivity increase.

As noted earlier, apart from its impact on productivity, inflation has affected international competitiveness through its impact on relative prices. There have usually been exchange-rate changes that have partially offset this impact, and these must be taken into account. For example, in the 1950s, inflation in the United States averaged about 1.5 percent a year and in Japan, about 2.2 percent (see Table 1-7). However, over this period, the yen devalued against the dollar by an average of 1.36 percent a year so that Japanese prices denominated in current dollars rose at only 0.85 percent per annum. Thus, U.S. prices rose faster than the Japanese price level (adjusted for exchange-rate changes) by about 0.65 percent per annum. In other words, the U.S. lost competitiveness to Japan over this period because of inflation. In the 1960s, there was less of an inflationary loss of competitiveness (0.17 percent), and during the 1970s there was a gain (2.96 percent) as the dollar sank against the yen.

Japan is exceptional in that, due to exchange-rate movements and inflation, it gained competitiveness against the United States over every sustained period (see Table 1-8). Canada made small gains—small because the economies are so interlinked—and Brazil also gained in the 1950s and '60s, but Germany, France and the United Kingdom consistently lost competitiveness because of inflation. For Germany and France, their more rapid gains in productivity offset their disadvantage on price, but the United Kingdom did not enjoy that compensation to the same extent. Obviously, Japan with its much more rapid productivity gains and the positive price impact on competitiveness was very well placed in the 1960s, but this relative advantage deteriorated somewhat in the 1970s.

**TABLE 1-7. INFLATION RATES AND RATES OF CHANGE IN EXCHANGE RATES: THE UNITED STATES AND JAPAN, 1950–79**
**(Annual Percentage Rates)**

| | Average Annual U.S. Inflation Rate | Average Annual Japanese Inflation Rate | Average Annual Exchange-Rate Change (Yen/Dollar) | Japanese Inflation Rate Adjusted for Exchange-Rate Change | Japanese Adjusted Inflation Rate Compared with that of U.S. |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) = (2) – (3) | (5) = (1) – (4) |
| 1950–60 | 1.50 | 2.21 | 1.36 | 0.85 | 0.65 |
| 1960–70 | 1.51 | 1.29 | – 0.05 | 1.34 | 0.17 |
| 1970–71 | 3.33 | – 0.78 | – 2.83 | 2.05 | 1.28 |
| 1971–72 | 4.45 | 0.79 | – 12.91 | 13.70 | – 9.25 |
| 1972–73 | 13.07 | 15.83 | – 10.52 | 26.35 | – 13.32 |
| 1973–74 | 18.83 | 31.39 | 7.48 | 23.91 | – 5.08 |
| 1974–75 | 9.29 | 2.29 | 1.81 | 0.48 | 8.11 |
| 1975–76 | 4.06 | 5.10 | – 0.08 | 5.18 | – 1.12 |
| 1976–77 | 6.12 | 1.81 | – 9.46 | 11.27 | – 5.15 |
| 1977–78 | 7.84 | – 2.52 | – 21.62 | 19.10 | – 11.26 |
| 1978–79 | 12.45 | 7.39 | 4.13 | 3.26 | 9.19 |
| 1970–79 | 8.72 | 6.37 | – 5.31 | 11.68 | – 2.96 |

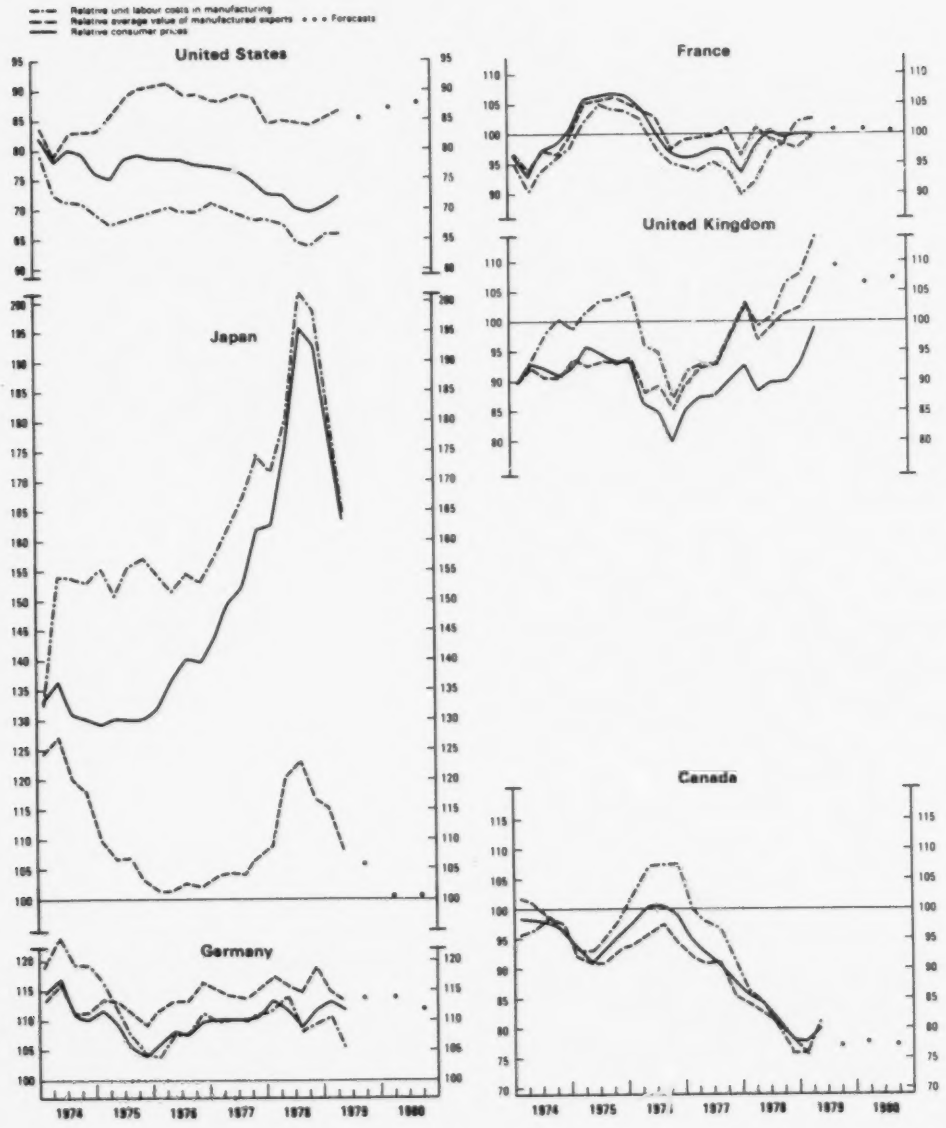
Sources: *IFS Yearbook*, 1979, and monthly *IFS*, April 1980.

**TABLE 1-8. INFLATION RATES ADJUSTED FOR EXCHANGE-RATE CHANGES, COMPARED WITH U.S. RATE, 1950–79**
**(Annual Percentage Rates)**

| | Average Annual U.S. Inflation Rate | Difference Between Adjusted National Inflation Rate and that of U.S. | | | | | |
|---|---|---|---|---|---|---|---|
| | | Japan | Germany | France | Brazil | U.K. | Canada |
| 1950–60 | 1.50 | 0.65 | – 0.59 | – 0.09 | 4.16 | – 1.42 | – 1.41 |
| 1960–70 | 1.51 | 0.17 | – 1.14 | – 0.13 | 1.16 | – 0.22 | 0.48 |
| 1970–71 | 3.33 | 1.28 | – 5.52 | 0.91 | – 1.53 | – 7.74 | – 2.30 |
| 1971–72 | 4.45 | – 9.25 | – 6.58 | – 8.69 | – 1.92 | – 3.12 | – 1.73 |
| 1972–73 | 13.07 | – 13.32 | – 9.69 | – 13.29 | – 0.46 | 7.64 | 2.83 |
| 1973–74 | 18.83 | – 5.08 | 2.24 | – 2.29 | 0.52 | – 1.79 | – 2.47 |
| 1974–75 | 9.29 | 8.11 | – 0.35 | 4.07 | 1.77 | – 5.42 | 2.08 |
| 1975–76 | 4.06 | – 1.12 | 2.51 | 8.17 | – 8.00 | 5.47 | 4.11 |
| 1976–77 | 6.12 | – 5.15 | – 4.27 | 3.33 | – 3.78 | – 10.30 | 6.08 |
| 1977–78 | 7.84 | – 11.26 | – 6.96 | – 4.54 | – 1.96 | – 10.33 | 5.97 |
| 1978–79 | 12.45 | 9.19 | – 1.30 | – 6.48 | 5.71 | – 9.21 | 0.98 |
| 1970–79 | 8.78 | – 2.96 | – 3.32 | – 2.09 | – 1.07 | – 3.87 | 0.85 |

Sources: *IFS Yearbook*, 1979, and monthly *IFS*, April 1980.

**FIGURE 1-1. MEASURES OF RELATIVE COMPETITIVE POSITION**
**(Indices in $U.S., 1970 = 100)**




Source: OECD, *Economic Outlook* (December 1979), p. 58. Reprinted with permission.

These bilateral comparisons are also supported by the multilateral analyses of the OECD that examine trends in export prices and labor costs as well as the general price level.[1] The average value of manufactured exports and unit labor costs in manufacturing fell in the United States relative to other OECD countries (see Figure 1-1). For example, unit labor costs in the United States in mid-1979 were about 68 percent of their former level in 1970 relative to unit labor costs in other OECD countries, after adjustment for exchange-rate changes. Japan, by contrast, experienced very large increases in unit labor costs. Germany, France and the United Kingdom experienced costs that fell somewhere in between, while Canada's experience paralleled fairly closely that of the United States.

While the foregoing discussion makes it clear that inflation has affected productivity and competitiveness abroad as well as in the United States, it has not been possible to estimate the size of this effect. There are, after all, a variety of other nonprice influences on competitiveness ranging from differences in language to differences in marketing styles. Suffice it to note that, since inflation accelerated in 1973, U.S. exports have grown in volume terms faster than imports in every year except 1977 and 1978 (see Table 1-9). Their growth has also outpaced the growth rates of Germany, the United Kingdom and Canada during most of these years, although not of Japan or France. In 1975, the volume of imports declined in six of the seven countries in the sample, as the full effect of oil price increases was felt; subsequently, the import volume picked up in relation to exports. The adequate trade performance of the United States suggests that its competitiveness has not in fact suffered too greatly during this inflationary period, but these aggregate indices disguise changes in the composition of trade. This issue is examined in more detail toward the end of the following discussion of the impact of inflation in the United States.

1 Apart from making comparisons with a weighted average of overall trends in OECD countries, these analyses differ from the foregoing analyses (Tables 1-7 and 1-8) by using effective exchange-rate changes rather than official exchange-rate changes and by using the consumer price index rather than the wholesale or industrial price index as the indicator of the general level of prices. The effective exchange-rate change is nothing more than the official bilateral exchange-rate change averaged using trade weights. These technical differences of approach do not materially affect the general observations made in the text.

# 2 The United States

## INTRODUCTION

The United States has done far less than the United Kingdom, Canada or Brazil to adapt its institutions, tax laws and accounting principles to sustained inflation. The welfare system has been partially indexed but the tax system has not. The federal government has not experimented with any indexed securities. There has been an active debate about inflation accounting since the early 1970s, and more recently requirements have been imposed on large corporations that they report some inflation-adjusted accounts with their historic cost accounts. However, there has been no appreciable influence of this inflation accounting exercise on the tax code. As a consequence of this incomplete adaptation, inflation has hurt the U.S. economy more than it might have. This chapter reviews how this occurred.

## PRODUCTIVITY GROWTH

The growth of productivity in the United States has been a subject of concern for at least a decade. Whatever the precise measure employed—national income per person employed, output per man-hour or GNP divided by civilian employment—it appears that productivity growth has decelerated in the 1970s and may have virtually stagnated during 1979.

A large number of factors contributed to the fairly steady growth of productivity through the 1950s and '60s. The shift from farming to industry and services, the improved education of the workforce and economies of scale from larger markets were among the most important factors. The increase in fixed capital or inventory per worker made a surprisingly small direct impact compared to these effects. However, new capital is a primary way in which new technology is brought into production, and advances in technology and other advances in knowledge, such as changed managerial and organizational techniques, probably accounted for over half of all productivity growth in this period.[1]

Why productivity growth slowed down so much thereafter is not as clear. Changes in the sex and age composition of the labor force is one well-understood factor, as is the reduced expenditure on research and development.[2] Government regulation regarding environmental protection, safety and product quality has im-

1 See Edward Denison, *Accounting for Slower Economic Growth* (Washington, D.C.: Brookings Institution, 1979), p. 2.

2 Rachel McCulloch, *Research and Development as a Determinant of U.S. International Competitiveness* (Washington, D.C.: NPA Committee on Changing International Realities, 1978).

**TABLE 1-5. THE STRUCTURE OF CENTRAL GOVERNMENT TAX REVENUES AS A PERCENTAGE OF TOTAL REVENUES**

| | U.S. | Japan | Germany | France | Brazil | U.K. | Canada |
|---|---|---|---|---|---|---|---|
| 1. Individual income tax | 42.18 | 31.57 | 16.67 | 12.58 | 1.16 | 34.06 | 35.47 |
| 2. Corporate profits tax | 14.80 | 26.73 | 4.50 | 6.00 | 7.32 | 6.85 | 15.22 |
| 3. Social security | 27.86 | (—) | 51.89 | 42.17 | 32.70 | 18.18 | 11.30 |
| 4. Domestic taxes on goods and services | 4.68 | 21.23 | 23.14 | 31.16 | 29.20 | 14.17 | 16.88 |
| 4a. Sales and VAT taxes | (—) | (—) | (11.97) | (22.65) | (0.02) | (8.25) | (1.58) |
| 5. Taxes on trade and other international transactions | 1.48 | 2.35 | 0.03 | 0.04 | 5.53 | 11.56 | 7.18 |
| 6. Other | 9.0 | 17.12 | 3.77 | 8.05 | 24.39 | 15.18 | 13.95 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: 1977 fiscal or calendar years for all countries except France (1976) and Brazil (1975); data for Japan are not available.
Source: IMF, *Government Finance Statistics Yearbook*, 1979.

**TABLE 1-9. INDICES OF EXPORT AND IMPORT VOLUMES, 1974-79**
**(1973 = 100)**

| | U.S. | Japan | Germany | France | Brazil* | U.K. | Canada |
|---|---|---|---|---|---|---|---|
| **Exports** | | | | | | | |
| 1974 | 109.1 | 117.1 | 111.4 | 109.6 | 107.4 | 104.9 | 96.2 |
| 1975 | 106.7 | 119.5 | 98.6 | 105.0 | 116.8 | 102.2 | 89.2 |
| 1976 | 110.4 | 145.8 | 109.9 | 114.6 | 118.2 | 111.1 | 99.8 |
| 1977 | 110.6 | 158.8 | 115.8 | 122.2 | 135.2 | 121.4 | 108.7 |
| 1978 | 123.8 | 156.9 | 120.6 | 129.5 | 158.3 | 126.8 | 119.2 |
| 1979 | 135.0 | 149.6e | 129.3 | 138.8e | 165.3e | 127.4e | 119.9e |
| **Imports** | | | | | | | |
| 1974 | 96.7 | 97.7 | 96.4 | 104.3 | 142.3 | 102.8 | 110.2 |
| 1975 | 85.8 | 85.5 | 97.0 | 96.9 | 117.0 | 94.1 | 104.2 |
| 1976 | 104.6 | 92.6 | 111.0 | 117.1 | 131.3 | 100.1 | 112.4 |
| 1977 | 115.4 | 95.0 | 115.0 | 118.0 | 121.6 | 102.4 | 112.9 |
| 1978 | 127.1 | 101.1 | 123.9 | 124.1 | 134.6 | 110.3 | 116.4 |
| 1979 | 128.5 | 111.6e | 135.0 | 136.5e | 136.2e | 117.7e | 128.4e |

e = estimates.
*Export indices exclude coffee because coffee exports are very volatile.
Sources: *IFS Yearbook*, 1979, and monthly *IFS*, March 1980.

posed costs in terms of delays in investment, increased paperwork and diverted managerial effort. Regulation definitely has contributed to business uncertainty. There have also been fewer opportunities linked to the exploration of economies of scale. However, just as the international data is difficult to explain, so there is in the case of the United States a substantial residual that cannot be precisely explained by quantifiable factors. Among this residual is the impact of inflation.

## INFLATION AND THE INCENTIVE TO WORK, TRANSFER PAYMENTS AND PERSONAL TAXES

Inflation can adversely affect productivity and competitiveness by reducing the incentive to work. At low levels of income, the tradeoff between employment and unemployment is affected by the level of government transfers available from the welfare system relative to available wage rates. Inflation can affect this tradeoff if transfer payments rise more quickly or more slowly than wages. At almost all levels of income, the interaction of the personal income tax code and inflation can reduce the incentive to work.

Considering first the impact of inflation on transfer payments, the effect is different for welfare, unemployment insurance and social security. Federally determined rules regarding welfare programs stipulate that the minimum income of indigent families must not fall below 65 percent of the poverty level. Thus, in principle, the minimum income of the unemployed will rise with the consumer price index

**TABLE 2-1. THE UNITED STATES: INDICES OF UNEMPLOYMENT BENEFITS, WEEKLY EARNINGS AND CONSUMER PRICES, 1960-79 (1967 = 100)**

| | Weekly Unemployment Benefits[1] | Average Weekly Earnings[2] | Consumer Prices |
|---|---|---|---|
| 1960 | 79.7 | 79.2 | 88.7 |
| 1970 | 122.0 | 117.7 | 116.3 |
| 1971 | 129.0 | 125.0 | 121.3 |
| 1972 | 137.6 | 134.4 | 125.3 |
| 1973 | 143.0 | 142.8 | 133.1 |
| 1974 | 155.8 | 152.0 | 147.7 |
| 1975 | 170.3 | 160.6 | 161.2 |
| 1976 | 182.2 | 172.3 | 170.5 |
| 1977 | 191.0 | 185.6 | 181.5 |
| 1978 | 202.8 | 200.0 | 195.4[p] |
| 1979 | 214.5[e] | 215.9[p] | 217.4[p] |

[1]Average weekly benefit check from state unemployment insurance programs.
e = estimate.
[2]Private nonagricultural.
p = provisional.
Source: *Economic Report of the President*, 1980.

as the poverty level is adjusted. If the total of food stamps, supplementary security income, aid for families with dependent children, and so forth adds up to more than the 65 percent minimum, then total income for the families concerned will rise in an *ad hoc* fashion when the individual state and federal programs are periodically adjusted.

Similarly, social security for the old and disabled is linked to the consumer price index. Thus, both minimum welfare payments and social security payments could rise faster than wages if inflation causes consumer prices to outstrip wages. In fact, their movement has been remarkably close (see Table 2-1).

Unemployment insurance is implicitly linked to the wage level. While the exact formula varies from state to state, the intention is much the same in all the states, namely, to provide unemployed persons about one-half of their previous income. Since, on average, this income rises with inflation, the level at which benefits start for the average newly unemployed is effectively linked to the average wage rate. The same is true of the maximum level of benefits, which is formally linked to the average wage rate in somewhat less than half the states and is adjusted periodically to achieve roughly the same effect in the remainder.

Thus, while transfer payments may well be a disincentive to work for some Americans, inflation appears to have had almost no intensifying or diminishing effect on this relationship.

Turning to income taxes, inflation affects both the tax rates and the tax base. The tax base increases as nominal incomes rise and the proportion of people with income above the complete exemption level rises. The average tax rate also increases since individuals move into higher tax brackets, not because of real increases in income, but solely because of inflation. Moreover, inflation reduces the real value of exemptions and standard deductions. For all these reasons, the real returns to working decrease as the general price level rises, unless there are offsetting *ad hoc* adjustments to the tax code.

In fact, there was a series of tax acts passed by Congress which cut nominal taxes and kept real tax rates almost constant between 1960 and 1975 (see Table 2-2). Congress cut taxes in the Revenue Act of 1964, the Tax Reform Act of 1969, the

**TABLE 2-2. THE UNITED STATES: AVERAGE INCOME TAX RATES, 1960-79 (Percent)**

| | Actual | Without Ad Hoc Cuts | | Actual |
|---|---|---|---|---|
| 1960 | 9.9 | 9.9 | 1976 | 10.3 |
| 1965 | 9.3 | 11.6 | 1977 | 10.4 |
| 1970 | 10.5 | 12.9 | 1978[e] | 11.0 |
| 1975 | 9.9 | 14.9 | 1979[e] | 10.8 |

e = estimates.

Sources: Estimated from E. Sunley and J. Pechman, "Inflation Adjustment for the Individual Income Tax," in H. Aaron, ed., *Inflation and the Income Tax* (Washington, D.C.: Brookings Institution, 1976), p. 159, and U.S. Treasury estimates. Sunley and Pechman data adjusted to maintain percentage changes with Treasury data.

Revenue Act of 1971, and the Tax Reduction Act of 1975. Without these cuts, the effective tax rates would have risen quite rapidly. In fact, Congress somewhat overcompensated the electorate since, in the absence of both the cuts and inflation, average income tax rates would have risen by about 1 percent over this period as real income increases pushed households into higher tax brackets.

Since 1975, inflation has accelerated and there have been further cuts in taxes. Although the federal tax acts of 1976, 1977 and 1978 all cut various classes of tax, average income tax rates have increased since then due to the greatly accelerated inflation rate. Moreover, 1980 rates could well top their historic high of 11.6 percent in 1969, but with tax cuts presently in process in Congress, they may fall somewhat in 1981.

Besides reducing the overall level of real income, inflation without tax changes affects marginal tax rates and the distribution of income. An increase in marginal tax rates reduces the work incentive of the affected income groups. Since higher income groups generally save more of their income, overall savings rates tend to be lowered, as taxes and inflation redistribute income away from the more wealthy.

Between 1960 and 1975, actual changes in tax law led to very different tax rates than would have existed without tax cuts and inflation or with the 1960 tax schedule being indexed (see Table 2-3). For those with annual incomes between $20,000 and $200,000, actual 1975 tax schedules resulted in higher marginal rates of taxation than would have been experienced had taxes been indexed in 1960. The average tax burden for those between $20,000 and $200,000 of annual income also worsened because of actual changes in the law over this period. Those in the lower tax brackets were strong gainers.

**TABLE 2-3. THE UNITED STATES: MARGINAL INCOME TAX RATES BY LEVEL OF INCOME* (Percent)**

| 1975 Gross Income Class (Dollars) | Actual 1975 Law | Indexed 1960 Law |
|---|---|---|
| 0-5,000 | 2.1 | 6.2 |
| 5,000-10,000 | 12.7 | 11.9 |
| 10,000-15,000 | 11.6 | 12.5 |
| 15,000-20,000 | 17.3 | 17.7 |
| 20,000-25,000 | 19.7 | 17.9 |
| 25,000-50,000 | 23.0 | 20.5 |
| 50,000-100,000 | 36.0 | 30.8 |
| 100,000-200,000 | 42.7 | 42.3 |
| 200,000-500,000 | 44.7 | 47.0 |
| 500,000-1,000,000 | 43.8 | 47.9 |
| 1,000,000 and over | 37.4 | 41.5 |

*The average level of income in the class minus the average level of income in the class below divided into the corresponding difference in income tax burdens.

Source: Estimated from Sunley and Pechman, "Inflation Adjustment for the Individual Income Tax," p. 160.

## INFLATION AND SAVING

In the United States, as in any other economy, saving is important for productivity in that it provides the resources for investment. Not all investment is productive—for example, investment in private housing has almost no relation to productivity—so that aggregate productive investment can move over time in different directions from saving. Fixed private investment for productive purposes as a percent of GNP has risen slightly since 1975, while private savings have fallen (see Table 2-4). Nonetheless, savings trends are of great concern for long-term investment prospects and therefore for both productivity and competitiveness.

Government savings as a percent of GNP have been somewhat unstable, although with the exception of 1973, consistently negative. They are also relatively small. They may be sensitive to inflation when current expenditures are likely to rise rapidly—which may explain the large negative value in 1975 of −4.2 percent of GNP—but, as already observed, we would expect government revenues to accelerate more on account of inflation.

Personal and business savings are more important. Consideration of the impact of inflation on corporate savings is deferred to the section in this chapter on corporate taxation where the determinants of personal savings are reviewed.

The annual series in Table 2-4 shows that personal savings out of disposable income have fallen fairly steadily since 1973. Over the 1950s and '60s, the personal savings rate averaged roughly 6 percent, but in the 1970s, it rose to a high of 7.8 percent by 1973, then fell to 4.5 percent in 1979. In the fourth quarter of 1979, the rate dropped to 3.8 percent, and while there has been some recovery in 1980, the rate is still low. Clearly, the situation is serious if this is more than a cyclical phenomenon.

Inflation almost certainly has played a part in this decline. For the reasons discussed in the previous section, income taxes in the last two or three years have lowered disposable income and may have led households to reduce their savings in order to achieve their consumption expectations. Equally, income tax/inflationary effects have probably hurt higher-income households disproportionately, and, as noted, it is precisely these households who contribute most to saving.

Perhaps more important, inflation has affected the real net-of-tax rate of return. This has happened because inflation and the tax system combine to decrease real net rates of return. As a simple example, a 4 percent nominal interest rate, subject to a 50 percent tax rate, yields a real aftertax rate of return of 2 percent when there is no inflation. If inflation then increases to 4 percent and the inflation premium is added to the nominal interest rate (increasing it to 8 percent), the real aftertax rate of return would fall from 2 percent to zero. If, as has probably been the case, the nominal interest rate is also kept down, net-of-tax interest rates can easily become negative. In the United States, private savings are quite sensitive to variations in real net rates of return. In a 1978 study, Boskin found that for every 1 percent change in the real interest rate, real savings increased by 0.4 percent.[3] Hence, recent sustained inflation at rates of 8 percent or more has led to a decrease in private saving through a reduction in the real aftertax rate of return on investment both because nominal rates have been held down and because of the impact of taxation on these nominal rates.

3 M.J. Boskin, "Taxation, Saving and the Rate of Interest," *Journal of Political Economy* (April 1978).

**TABLE 2-4. U.S. SAVINGS TRENDS, 1950–79**
**(Percent)**

| | Personal Savings as a Percent of Personal Disposable Income | Personal Savings as a Percent of GNP | Business Savings as a Percent of GNP | Government Savings as a Percent of GNP | Government Revenue as a Percent of GNP | Fixed Investment in Producer Durable Equipment as a Percent of GNP |
|---|---|---|---|---|---|---|
| Average 1950–59 | 6.3 | 4.4 | 11.3 | – 0.2 | 25.7 | 5.9 |
| Average 1960–69 | 6.0 | 4.1 | 11.7 | – 0.2 | 28.7 | 6.3 |
| 1970 | 7.4 | 5.2 | 10.3 | – 1.0 | 30.8 | 6.4 |
| 1971 | 7.7 | 5.4 | 10.9 | – 1.7 | 30.3 | 6.1 |
| 1972 | 6.2 | 4.2 | 11.2 | – 0.3 | 31.4 | 6.3 |
| 1973 | 7.8 | 5.4 | 10.7 | 0.5 | 31.5 | 6.7 |
| 1974 | 7.3 | 5.1 | 9.8 | – 0.2 | 32.2 | 6.3 |
| 1975 | 7.4 | 5.5 | 11.7 | – 4.2 | 30.6 | 6.3 |
| 1976 | 5.7 | 4.0 | 12.2 | – 2.1 | 31.6 | 6.2 |
| 1977 | 5.0 | 3.4 | 12.1 | – 1.0 | 31.9 | 6.7 |
| 1978 | 4.9 | 3.4 | 11.9 | 0.0 | 32.2 | 6.8 |
| 1979 | 4.5 | 3.1 | 11.7 | – 0.6 | 32.6 | 6.8 |

Source: *Economic Report of the President*, 1980.

Real interest rates have fallen for two reasons. First, the market has consistently underestimated what inflation would in fact be, so that ex *post* interest rates have been lower than either borrowers or lenders intended. Second, for small savers, the effect of Regulation Q regarding deposits at commercial banks and its extensions to other savings institutions has been to hold down returns. Households with savings that were too small to provide access directly to the capital market have had the nominal rate of return depressed by these institutional constraints. Originally intended to protect the viability of the financial intermediaries by preventing excessive competition for funds, Regulation Q (now being phased out) may well have contributed significantly in the last several years to the decline of the savings rate.

A number of authors have speculated about other effects of inflation on saving. For example, Mundell argues that inflation could increase saving because it lowers the value of accumulated wealth, and consumers attempt to restore their wealth-income position.[4] There is also an uncertainty argument which leads to a similar result: consumers hedge by spreading the loss of income over more than one period. These effects may, to some extent, offset the effects of the rate of inflation acting through real interest rates, but on balance it seems clear that inflation has adversely affected personal savings.

## INFLATION AND FINANCIAL ASSETS

The efficiency of equity and bond markets bears heavily on the ease with which new investment can be financed. Investment, as discussed above, is crucial for continued increases in productivity.

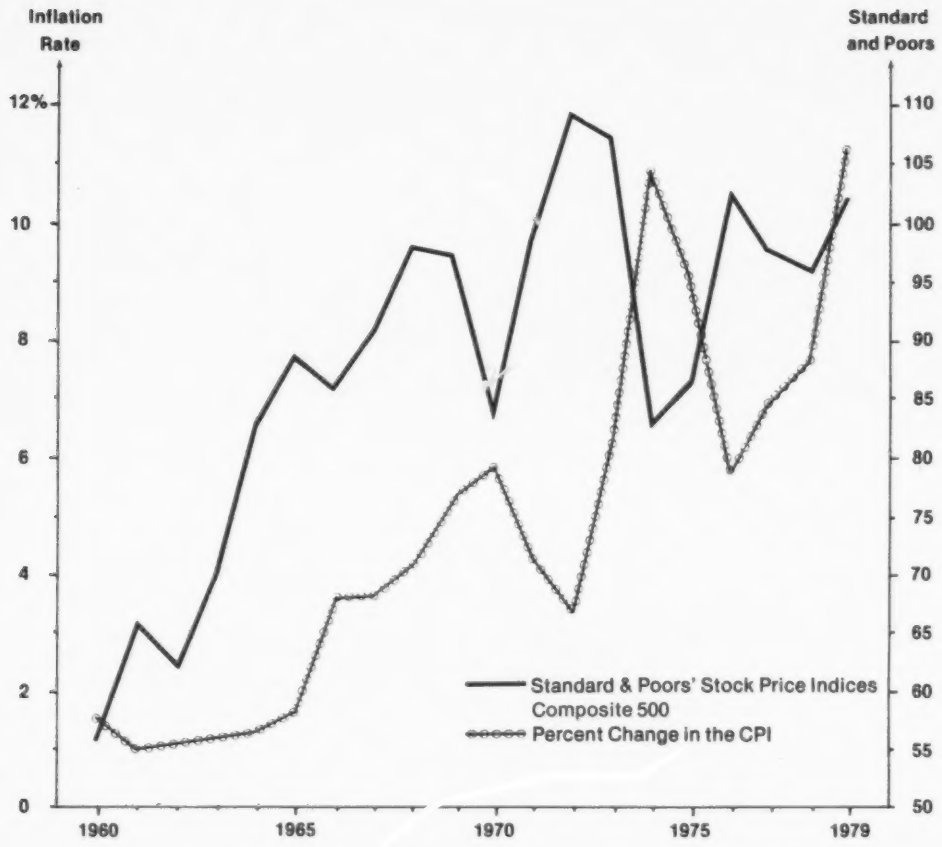
The value of common stocks, determined as they are by expectations of future net income, ought generally to rise with inflation. If the expected real income stream of an enterprise is not adversely affected by inflation, then the real value of the equity should not be. This is, in fact, roughly what occurred over the period 1960 to 1979 (see Figure 2–1), and there does appear to be an upward trend to nominal stock prices. However, this trend does not completely offset inflation in the long run, and in the short run, there even appears to be an inverse relationship: when inflation peaks, stock prices drop. Concentrating first on the long-run trends, the 1960s and '70s seem quite different (see Table 2–5). Before 1971—a year when both stock prices and inflation were mid-cycle—stocks rose faster than inflation, which was modest, and growth expectations were fairly firm. Then, in the 1970s, with much higher inflation rates, the trend was for stagnant stock prices in nominal terms, so that real equity values were eroded. It appears that inflation, even when it is expected, can in fact erode stock prices.[5]

There are a number of possible reasons for this. One is risk aversity among equity holders: when prices rise, even when the rise is anticipated, they perceive that

4 R. Mundell, "Inflation and Real Interest," *Journal of Political Economy* (June 1963).

5 Zvi Bodie and Charles Nelson in two separate studies for the *Journal of Finance* in 1976 showed that equity values fell when prices increased, whether or not inflation was expected. Their more rigorous analysis was for the period 1955 to 1974, whereas the more casual observations here are five years more up to date. See Z. Bodie, "Common Stocks as a Hedge Against Inflation," *Journal of Finance* (May 1976) and C. Nelson, "Inflation and Rates of Return on Common Stocks," *Journal of Finance* (May 1976).

**FIGURE 2-1. STOCK PRICE INDICES AND PERCENT CHANGE IN THE CPI, 1960–79**




Sources: Standard and Poors, and *Economic Report of the President*, 1980.

the uncertainty surrounding enterprise income increases, and market pressures therefore lower the value of common stock. The second influence in this direction might be the anticipated effect of corporate taxation, lowering aftertax income relative to gross income before tax. Third is the effect inflation has on the general business climate. If it becomes more difficult to fix contracts, to judge price trends, to make investment decisions as the price level rises, increases in inflation could well exert downward pressure on income and therefore on equity prices. Fourth, there is probably a persistent expectation that the government will slow growth to control inflation. Thus, even expected inflation can depress equity prices.

The second aspect of the relationship occurs in the short run: when inflation rises, equity values dip. This may be explained by the impact of unexpected changes

**TABLE 2-5. THE UNITED STATES: STOCK PRICES, CONSUMER PRICE INDEX AND GNP, 1960-79 (Average Annual Percentage Changes)**

| | CPI | Stock Prices | GNP |
|---|---|---|---|
| 1960-79 | 4.83 | 2.44 | 3.56 |
| 1960-71 | 2.85 | 4.82 | 3.77 |
| 1971-79 | 7.66 | (0.29) | 3.26 |

Source: See Figure 2-1.

in inflation on the yield. If the yield is a function of the expected real rate of return, growth prospects and the expected rate of inflation, then unexpected increases in inflation should result in upward revisions of nominal yields and therefore downward revisions of equity values. So, if the short-term changes in the inflation rate are not wholly anticipated, it is not difficult to explain dips in equity values when inflation increases, and vice versa.

Bond markets show some similar dependence on inflation. When more rapid inflation is anticipated, rates offered on new issues go up to maintain real rates of return. Older bonds which were issued when anticipated inflation was lower tend to fall in value. Thus, across the whole market, unanticipated short-term changes in inflation will tend to affect bond values as they do equities for much the same reasons, and long-term gradual increases in inflation will depress older bond values if the gradual increase was not anticipated at date of issue. But new issues will be at higher yields and their value should be sustained.

Thus, in both bond and equity markets, more inflation leads to more uncertainty and to unstable and depressed asset prices. It becomes more difficult for a lender to judge his total return (capital gain plus nominal return) and what it will be worth (total return net of inflation) and for the borrower to assess the cost of capital.

Thus, inflation may act on both the bond and equity markets to reduce their efficiency. Both anticipated and unanticipated inflation affects the perceptions and the realities facing borrowers and lenders. To the extent that new enterprise development, existing enterprise expansion and, in general, private-sector growth depend heavily on the efficient workings of the capital market, productivity and competitiveness are hurt by the impact of inflation on financial markets.

## INFLATION AND INVESTMENT AND BUSINESS OPERATIONS

Unanticipated and erratic movements of the general price level can lower productivity by increasing uncertainty about relative prices.[6] Suppliers and users of goods and services may not always be able to distinguish nominal movements from

6 R.E. Lucas, Jr., "Expectations and the Neutrality of Money," *Journal of Economic Theory* (April 1977), pp. 103-124.

relative movements of the price level. Suppliers, of course, do not wish to increase output if the source of price change is simply price inflation, but do wish to do so if the price rise reflects a relative increase in real demand. Similarly, users are concerned to find substitutes for inputs or to economize on their use if their relative price is rising, but not if inflation is the cause. The general risks of doing business increase, and as a result suppliers and users are likely to become somewhat more averse to risky new business opportunities. The result is suboptimal economic performance.

While reading prices becomes more difficult, setting them becomes harder too. Firms adjust prices only periodically during inflation since there are real costs associated with price adjustments. With inflation, a firm's real prices vary over the interval between price fixing. Partly for this reason, inflation itself is less smooth at higher rates of inflation. This too creates problems for business transactions.[7]

Table 2-6 shows an example of both these phenomena. The prices of coal and electricity varied relative to one another a great deal more in 1978 when inflation over the year was 9.0 percent than in 1965 when inflation was only 2.0 percent. Equally, the increase in the consumer price index was more variable in 1978 than in 1965. Comparisons between other products and over different periods confirm the view that relative price variability and inflation rate variability increase with inflation. Cross-section studies confirm the second point. In a study of 34 countries from the period 1952–74, Fischer and Modigliani estimated that the variance of the transitory inflation rate increased by 0.8 for every percentage point rise in the underlying inflation rate.[8] When the underlying rate fell to roughly zero, there was virtually no variation.

These problems are particularly serious when investment decisions have to be made. Expenditures on plant, machinery and equipment must meet the test that they are expected to generate profits and cover financing costs, and this assessment depends on expectations about relative prices, inflation rates and the real rate of interest. As uncertainty increases, risk-averse businesses will undertake fewer investments because only the most profitable will generate an adequate "risk premium." For this reason, increases in inflation inhibit investment.[9]

Increases in inflation also make investment financing riskier because of price uncertainty. Some economists have argued that individuals and firms are more reluctant to enter into long-term contracts in an uncertain environment. However, fixed capital at least is a long-term commitment by a business, and if it is more difficult to finance this with long-term financial investments so that short-term borrowing is used instead, the business must assume the risk that will be faced when refinancing is eventually undertaken. This financing effect also can inhibit investment.

Thus, because relative prices become less certain and because inflation becomes less predictable as inflation rates rise, inflation inhibits business operations of all kinds. In particular, it increases the risks associated with new investments in

7 R. Parks, "Inflation and Relative Price Variability," *Journal of Political Economy* (February 1978).

8 S. Fischer and F. Modigliani, "Aspects of the Costs of Inflation," unpublished MIT working paper (1977).

9 Parks, "Inflation and Relative Price Variability."

**TABLE 2-6. THE UNITED STATES: RELATIVE PRICE AND INFLATION RATE VARIABILITY, 1965 AND 1978 (Annual Percent Changes)**

| Changes over Previous Month | The Relative Price of Coal to Electricity | | The Consumer Price Index | |
|---|---|---|---|---|
| | 1965 | 1978 | 1965 | 1978 |
| January | 3.7 | – 7.0 | 1.1 | 7.3 |
| February | 3.7 | – 11.6 | 0.0 | 8.0 |
| March | – 11.6 | – 25.7 | 1.1 | 9.3 |
| April | – 28.6 | 68.6 | 3.4 | 11.4 |
| May | 0.0 | 7.6 | 3.3 | 11.9 |
| June | 1.3 | – 11.7 | 5.7 | 13.1 |
| July | 7.8 | 15.9 | 1.1 | 9.0 |
| August | 6.5 | 19.8 | – 2.1 | 6.9 |
| September | 10.6 | 7.2 | 2.2 | 9.5 |
| October | 9.0 | – 0.1 | 2.2 | 10.0 |
| November | 2.5 | 11.5 | 2.2 | 6.8 |
| December | 2.4 | – 4.2 | 4.4 | 5.5 |
| Changes Dec. to Dec. | 0.2 | 4.1 | 2.0 | 9.0 |
| Month to month variation: Standard deviation | 10.8 | 23.7 | 2.1 | 2.3 |

Sources: *Survey of Current Business*, various issues, and *Economic Report of the President*, 1980.

plant and equipment. As inflation has accelerated in the United States, this has contributed to the decline in productivity and has reduced competitiveness.

## INFLATION ACCOUNTING

Concern with the impact of inflation on business accounts was already considerable in the early 1970s. The idea of adjusting statements for financial reporting and for tax purposes was the subject of debate in the academic and professional communities for some time. The Financial Accounting Standards Board (FASB) ran a "field test" between 1972 and 1974 to experiment with some of the emerging concepts. Starting in 1976, the Securities and Exchange Commission (SEC) added to the 10-K reporting requirements for large firms that they report the cost of goods sold, depreciation, inventory and property, and plant and equipment on the basis of replacement costs parallel with the conventional historical cost figures. Then in 1979, the FASB issued Statement 33 that requires large firms to report both constant and current dollar statements parallel with their conventional statements.

Constant dollar statements measure financial flows, assets and liabilities in units of the same purchasing power. Thus, expenditures in 1972 expressed in 1972 dollars are scaled up by the change in the consumer price index between 1972 and

1980 and thereby expressed in 1980 dollars for inclusion in a constant dollar statement prepared in 1980. Current dollar accounts measure financial accounts at their current cost or recoverable amounts, whichever is lower. This is very close to the replacement cost approach. Either replacement costs or current dollar accounts can be approximated by applying specific indices to past revenues and expenditures. Thus, expenditures on, say, packaging machinery in 1972 expressed in 1972 dollars are scaled up by the change in the price index for packaging machinery between 1972 and 1980 and thereby expressed in 1980 current dollar terms.

The impact of these adjustments can be very significant on reported income and taxable income. Davidson and Weil estimated the impact of constant dollar accounting for a number of U.S. companies for 1974 (see Table 2-7). Even then, when inflation had not been sustained for a period, the impact was significant. Depending on a number of factors, including the age of plant and equipment, the size of inventories, whether last-in-first-out (LIFO) or first-in-first-out (FIFO) methods were used to compute cost of goods sold and inventory valuations in the conventional accounts, the impact of the adjustment was greater or smaller. The gain on monetary items, added in column 3 of Table 2-7, reflects the advantage most corporations enjoy when inflation reduces their effective debt service obligations. Most nonfinancial corporations are net debtors and gain from unanticipated inflation since almost all corporate debt is on fixed interest terms. Net creditors lose on this account.

The debate on how adjustments should be made is not over by any means. The fact that the FASB requirements call for not one but two additional types of report and that they are still restricted to large companies reflects continuing doubts. For example, it is debatable whether net gain on monetary items ought to be included: when inflation is anticipated and interest rates are consequently higher, net debtor corporations do not enjoy any gain. It is only unanticipated inflation that leads to this (noncash flow) gain. Given the difficulties that exist in measuring unanticipated inflation, it is questionable whether any adjustment on this account should be made. (Appendix 1 provides a rigorous argument against this adjustment.)

## INFLATION AND TAXATION OF CAPITAL INCOME

The current U.S. tax system does not distinguish between real and nominal returns to capital, and therefore tax liabilities on capital income are sensitive to inflation. By and large, these liabilities rise as inflation increases, depressing corporate aftertax income and thereby investment.

Changes in tax liabilities associated with nonfinancial corporations were recently analyzed by Feldstein and Summers. Their results are summarized in Table 2-8 for the period 1960 to 1977.

In the 1960s, the historic cost basis of calculating depreciation allowances for tax purposes resulted in a relatively modest overpayment of corporate income taxes. Had depreciation allowances been scaled up to take inflation into account, income for tax purposes would have fallen sufficiently in 1960 to have lowered taxes by $3.2 billion. By 1970, this overpayment had risen slightly to $4.8 billion; thereafter the increase was rapid so that by 1977, $19.1 billion represented the excess tax liability because depreciation allowances for tax purposes were not inflation adjusted.

**TABLE 2-7. THE UNITED STATES: ESTIMATES OF TAXABLE INCOME AS CONVENTIONALLY REPORTED AND AFTER GENERAL PRICE LEVEL ADJUSTMENT, 1974***

| | Taxable Income as Conventionally Reported (Historical Dollars/Millions) | Taxable Income after Price Level Adjustment | | Taxable Income after Price Level Adjustment as Percent of Conventionally Reported Taxable Income | |
|---|---|---|---|---|---|
| | | Before Gain on Monetary Items (End-of-1974 Dollars/Millions) | Incl. Gain on Monetary Items (End-of-1974 Dollars/Millions) | Before Gain on Monetary Items | Incl. Gain on Monetary Items |
| American Telephone & Telegraph | 2,489.8 | 1,039.2 | 4,638.7 | 42 | 186 |
| Anaconda | 150.9 | 127.0 | 166.0 | 84 | 110 |
| Bethlehem Steel | 502.5 | 356.4 | 419.2 | 71 | 83 |
| Du Pont | 483.3 | 244.2 | 254.3 | 50 | 53 |
| Esmark | 124.0 | 70.9 | 107.2 | 57 | 86 |
| Exxon | 16,168.8 | 16,357.2 | 16,431.8 | 101 | 102 |
| General Electric | 751.0 | 597.9 | 775.2 | 80 | 103 |
| General Motors | 1,064.8 | 67.2 | 253.5 | 6 | 24 |
| International Harvester | 207.1 | 24.5 | 133.7 | 12 | 65 |
| Sears Roebuck | 420.8 | 142.2 | 116.0 | 34 | 27 |
| United Technologies | 197.5 | 95.4 | 126.3 | 48 | 64 |

*The general price level adjustment used here was the GNP implicit price deflator as in the early FASB proposal. There is not much material difference between this and the CPI in principle, although clearly in practice small differences between these indices could have important implications.

Source: Sidney Davidson and Roman Weil, "Inflation Accounting: Implications of the FASB Proposal," in H. Aaron, ed., *Inflation and the Income Tax* (Washington, D.C.: Brookings Institution, 1976), p. 100.

The second serious effect inflation has on corporate income tax is via the accounting for inventory and cost of goods sold. If first-in-first-out accounting is used, then there is a spurious inventory profit during inflationary periods because the cost of goods sold is recorded at historic beginning-of-inventory prices, and net income is correspondingly swollen. The opposite is true, however, if last-in-first-out inventory accounting methods are used: inflation can in fact lead to tax savings (see Appendix 2). Although U.S. nonfinancial corporations traditionally used FIFO, they have changed many of their inventories to LIFO, especially after the inflationary surge of 1974. As a result, the effect of inflation on corporate taxes because of inventory accounting practices rose from less than $1 billion a year in the 1960s to $19.4 billion in 1974, but fell to $7.0 billion in 1977 as inflation dropped somewhat and LIFO was more widely adopted.

Because nonfinancial corporations are net borrowers, their real tax liabilities are reduced by deducting interest on debt that includes an inflation premium in the interest rate. This is the tax effect of the income adjustment for net gain on monetary items discussed in the previous section. If this is taken into account, it sharply offsets the inventory and depreciation effects. However, the extra tax burden that corporate creditors face, because their nominal rather than real interest income is taxed, should also be considered (column 6 of Table 2-8). In 1977, the creditor tax increase was $17.7 billion against a nonfinancial corporate gain of $15.1 billion.

The inflationary effect on shareholders' income tax liability is also important. There is a small positive effect because corporate income tax increases on account of inflation reduce net income and therefore dividends and retained earnings. The much larger negative effect is caused by the taxation of nominal capital gains. By 1977, this was estimated to have led to an increase of $5.3 billion in tax liabilities.

These various effects of inflation interacting with the present tax codes had, by 1977, imposed an extra tax burden of $32.3 billion on capital income from nonfinancial corporations. Excluding the adjustment for net gains on monetary items, the increase was $47.4 billion. This represented roughly 80 percent of total corporate income taxes paid that year. The worst year, whether or not the tax effect of the net gains on monetary items adjustment is included, was 1974: well over one-half of income taxes paid by corporations were a consequence of inflation, and when the additional burden to shareholders and creditors is taken into account, the inflation-induced addition to tax liabilities equalled almost one and one-half times as much as corporate income taxes.

These tax effects undoubtedly contribute to a fall in savings and investment. If aftertax returns to shareholders and creditors are to be maintained, the return on income before tax must increase substantially not only to cover inflation but also the increased tax burdens associated with inflation. The implication is that potential new investments must pass a particularly high rate of return hurdle when inflation is serious.

There are secondary effects of inflation and corporate taxation on investment that should be noted. First, the interaction of inflation and taxation affects the allocation of investment, favoring short-lived assets and penalizing large, heavy capital investment. Since, to some degree, there is a need for longer gestating, longer-lived projects to take advantage of technology, this is particularly troublesome for U.S. competitiveness. Second, because of the tax advantage

associated with debt, corporations have tended to finance more of their activity by debt and less by equity. This inevitably dilutes ownership control and increases backruptcy risks. Tideman and Tucker estimate that movement from stable prices to a 10 percent steady-state inflation rate increases the tax burden of a firm with a ratio of equity to assets of 0.75 by an amount approximately equal to 1.5 percent of the firm's assets.[10] On the other hand, a firm with a ratio of only 0.35 enjoys a tax saving roughly equal to 0.3 percent of its assets. Firms with ratios of 0.55 and 0.45 face a tax increase approximately equal to 0.5 percent and 0.2 percent of their assets, respectively.

## INFLATION, COMPETITIVENESS AND TRADE

So far, the discussion has focused on the effect of inflation on productivity via the incentives to work, to save and to invest, and the effect on individual sectors has been cursory. This section looks more closely at the effect of inflation on price competitiveness and trends in trade flows for manufacturing and for the two-digit classifications of industry.

The direct effect of inflation on the competitiveness of U.S. industry is via prices of U.S. manufactures versus those of foreign competition. As was noted toward the end of Chapter 1, the United States did in fact fare favorably in terms of cost trends compared with other major OECD nations when the offsetting effect of exchange-rate changes was taken into account. This was true over the 1970–79 period when unit labor costs in manufacturing, the general price level and the average value of manufactured exports all fell relative to the OECD region as a whole (see Figure 1–1).

In the absence of exchange-rate changes, what would have happened to price competitiveness? In other words, what was the effect of inflation taken by itself compared with inflation in other countries? The effects between 1974 and 1979 are summarized in Figure 2–2, A and B. Figure B shows that relative consumer prices and labor costs both fell, excluding the exchange-rate change. Unit labor prices here reflect the cost of labor per unit of output and thus combine the effect of changes in wage rates and changes in productivity. That they were lower in 1979 than in 1974 implies that productivity gains were greater than wage increases, at least relative to the experience in other major OECD countries.

The rising trend in the unit value of manufactured exports, relative to those of other countries, reflects a rise in unit costs. (In particular, it does not reflect any shift in the composition of exports to more valuable product categories.)

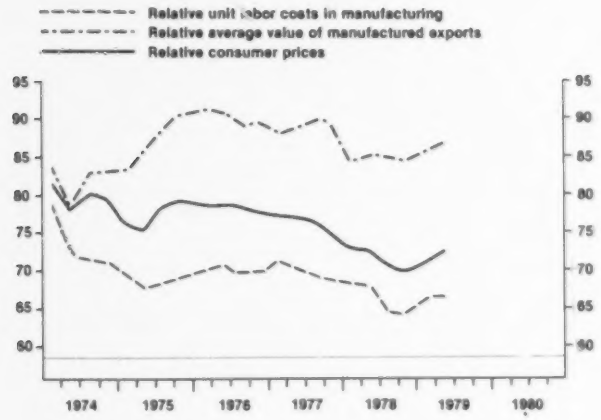
Since unit labor costs have fallen, relatively speaking, the material and capital cost trends have to explain the relative rise in unit export values. Given how much capital costs are forced up via the interaction of inflation and taxation, this is not surprising.

The U.S. trade balance across all goods for this period, 1970–79, improved fairly consistently (see Table 1–9). For manufactures, the picture was not quite so good,

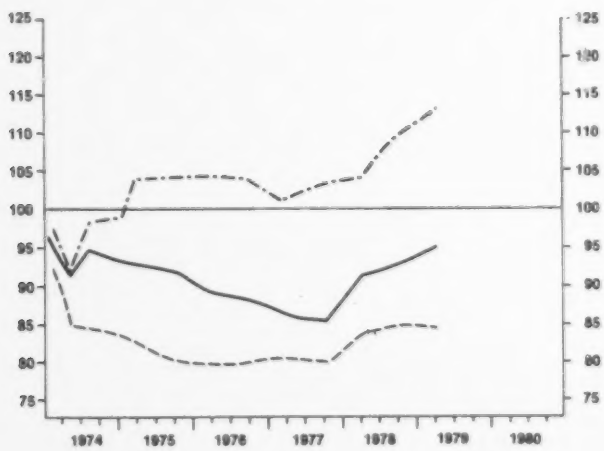
10 Tideman and Tucker, "The Tax Treatment of Business Profits Under Inflationary Conditions," in H. Aaron, ed., *Inflation and the Income Tax* (Washington, D.C.: Brookings Institution, 1976).

**FIGURE 2-2. THE UNITED STATES: MEASURES OF RELATIVE COMPETITIVE POSITION, WITH AND WITHOUT THE EFFECT OF EXCHANGE-RATE CHANGES, 1974–79**
**(Indices in $U.S., 1970 = 100)**

**A. Taking Exchange-Rate Changes into Account**




**B. Without Taking Exchange-Rate Changes into Account**




Source: OECD, *Economic Outlook* (December 1979), pp. 58 and 121. Reproduced with permission.

but nonetheless, a rough balance was maintained (see Table 2-9). This suggests that, while U.S. competitiveness undoubtedly suffered because of inflation over this period, the effects of inflation on major trading partners of the United States have permitted the maintenance of rough trade parity.

Sector by sector, the impact of inflation has been different. Table 2-10 shows how exports of individual industries fared relative to manufactured exports as a whole, and how much inflation added to the tax burden on capital income as a percentage of total taxation on capital income. If this inflationary effect contributed to competitiveness significantly, one would expect to see industries with high export growth enjoying low additional taxation on account of inflation, and vice versa. Textiles, stone and clay products and primary metals were three industries with high inflation taxes and relatively poor export performance; apparel, leather and nonelectrical machinery appear to have fared relatively well in exports and to have relatively little extra tax burden because of inflation. For these industries, the observed data directly support this connection between inflation and export competitiveness. But there are other influences on export trends that no doubt explain why the expected connection is not observed in the remaining industries. Moreover, the picture is incomplete because imports, for which exact data are difficult to find, were not taken into account. There is one final caveat—that the effects of taxation/inflation interactions are spread out over many years, and it would be surprising if, in the first few years, relative increases in tax burdens exactly matched relative export growth. Despite these qualifications, it can be concluded that some industries with relatively poor export performance have been more seriously affected than the average by the impact of inflation on the tax burdens they bear.

**TABLE 2-9. U.S. MANUFACTURED EXPORTS AND IMPORTS, 1970-79**
**(Billions of Dollars, f.a.s.)**

| | Exports | Imports* | Imports as a Percent of Exports |
|---|---|---|---|
| 1970 | 29.3 | 25.9 | 88.4 |
| 1971 | 30.4 | 30.4 | 100.0 |
| 1972 | 33.7 | 37.8 | 112.2 |
| 1973 | 44.7 | 45.0 | 100.7 |
| 1974 | 63.5 | 55.2 | 86.9 |
| 1975 | 71.0 | 51.1 | 72.0 |
| 1976 | 77.2 | 64.8 | 83.9 |
| 1977 | 80.2 | 76.6 | 95.5 |
| 1978 | 94.5 | 100.4 | 106.2 |
| 1979 | 105.9 | 102.4 | 96.7 |

*Customs value basis between 1970 and 1973 and only free alongside ship (f.a.s.) thereafter. Both custom and f.a.s. values are less than cost including freight.
Source: *Economic Report of the President*, 1980, p. 320.

**TABLE 2-10. THE UNITED STATES: EXPORT GROWTH BETWEEN 1972 AND 1976 AND INCREASED TAX BURDEN DUE TO INFLATION IN 1976, BY 2-DIGIT INDUSTRIAL CATEGORY**

| SIC Code | Industrial Products | Exports' Relative Growth in Value (Annual Percentage)* | Exports' Ranking | Add. Taxes as a % of Actual Taxes | Ranking of Taxes |
|---|---|---|---|---|---|
| 20 | Food | – 2.8 | 15 | 24.4 | 12 |
| 21 | Tobacco | – 0.5 | 12 | 12.1 | 18 |
| 22 | Textiles | – 4.4 | 17 | 41.6 | 7 |
| 23 | Apparel | 1.1 | 8 | 12.2 | 17 |
| 24 | Lumber | 0.8 | 10 | 100.0 | 2 |
| 25 | Furniture | 10.1 | 1 | 28.0 | 10 |
| 26 | Paper | 0.0 | 11 | 87.0 | 4 |
| 27 | Printing | – 6.4 | 18 | 16.0 | 15 |
| 28 | Chemicals | 1.0 | 9 | 34.0 | 8 |
| 29 | Petroleum & coal | 1.9 | 6 | 53.0 | 5 |
| 30 | Rubber | 8.3 | 2 | 100.0 | 2 |
| 31 | Leather | 4.9 | 3 | 7.9 | 20 |
| 32 | Stone, etc. | – 1.3 | 14 | 52.9 | 6 |
| 33 | Primary metal | – 3.7 | 16 | 100.0 | 2 |
| 34 | Fabricated metal | 2.8 | 5 | 32.0 | 9 |
| 35 | Nonelectrical machinery | 1.2 | 7 | 10.4 | 19 |
| 36 | Electrical machinery | 4.6 | 4 | 24.6 | 11 |
| 37 | Transportation | – 0.6 | 13 | 22.2 | 13 |
| 38 | Instruments | – 32.3 | 20 | 12.8 | 16 |
| 39 | Miscellaneous | – 15.0 | 19 | 19.9 | 14 |

*The percentage deviation of export growth rates from the rate of growth of the value of all manufactured goods.
Sources: For column 1, see the *Annual Survey of Manufacturing* (U.S. Department of Commerce, 1976); for column 3, see M. Feldstein and L. Summers, "Inflation and the Taxation of Capital Income in the Corporate Sector," *National Tax Journal* (December 1979).

## CONCLUSION

Inflation has increased the uncertainty the business community has had to face in the United States and thereby has inhibited investment. As important, it has, in combination with the present tax codes, greatly increased the necessary return of new investments and reduced the potential benefits of new savings. Since the volume of both is quite sensitive to the return, the effect has been to inhibit new capital formation. Capital deepening and the embodiment of new technology have both slowed down as a result. These effects, combined with the disincentive effect on work of increased taxation on personal income, have contributed to a fall in productivity.

Inflation has also hurt competitiveness through prices. While exchange-rate changes have, in the United States, more than offset the effect of inflation on labor costs and unit export prices, with less inflation U.S. industry would have been more price competitive.

The United States has moved slowly to deal with inflation and to insulate the economy from its more harmful effects. Other countries with different histories of inflation have begun modifying their basic economic institutions to deal with continuing inflation. The next three chapters review some of these adjustments in Canada, the United Kingdom and Brazil.

# Canada 3

## INTRODUCTION

Canada's effort to insulate its economy from inflation has focused on the personal income tax and the social security welfare systems. The federal government has not encouraged indexation of contracts in the capital market; for example, there have been no issues of indexed government bonds. Nor has there been a consistent approach to the protection of capital income from the adverse effects of inflation. Consequently, some of the distortions that have affected the U.S. economy in recent years have been ameliorated in Canada, while others have probably been exacerbated.

## INDEXING PERSONAL INCOME TAXES

In January 1974, the federal government introduced an automatic inflation adjustment mechanism to shield personal incomes from the adverse impact of income taxes set in nominal terms. Each year, tax bracket limits and personal exemptions have been increased by an inflation adjustment factor based on the inflation rate in the recent past. Other deductions have not been automatically adjusted, but this is not a serious shortcoming because the personal exemption represents 80 percent of all deductions. The inflation adjustment factor has been based on movements in the GNP deflator rather than the consumer price index. In principle, this adjusted tax brackets so that real increases in income and productivity would be taxed progressively rather than real increases in purchasing power over consumer goods. In practice, it has made very little difference.

More important than the choice of index to which the inflation adjustment factor is related has been the lag involved in its estimation. At the beginning of any calendar year, which is coincidentally the beginning of the fiscal year, the last month for which price data are available is the previous September. For this reason, the inflation adjustment factor is based on the change in the GNP deflator over the previous September to September period. Inflation in earlier periods is also given a small weight in the formula for the adjustment factor. The effect of the lag is to undercorrect in periods when inflation is accelerating and to overcorrect when the inflation rate is falling. Consequently, during periods of accelerating inflation there is a negative impact on the incentive to work, which, although small, could well have some significant effect on productivity. Conversely, when inflation decelerates, the adjustment factor is too large, so that aftertax incomes are somewhat higher than they otherwise would be. If the inflation fall coincides with a downturn in the business cycle, this is anticyclical and probably beneficial to the

**TABLE 3-1. CANADA: THE INFLATION ADJUSTMENT FACTOR FOR PERSONAL TAXES AND THE CHANGE IN THE GNP DEFLATOR, 1974-77**
**(Percent)**

| | Inflation Adjustment Factor | Change in Implicit GNP Deflator |
|---|---|---|
| 1974 | 6.6 | 14.3 |
| 1975 | 10.1 | 10.7 |
| 1976 | 11.3 | 9.5 |
| 1977 | 8.6 | 6.8 |

Source: Various government publications.

economy; if not, it would well overstimulate aggregate demand and tend to sustain inflation.

Table 3-1 shows that differences between the inflation adjustment factor and the GNP deflator have in fact been quite large. In 1974 and 1975, the inflation adjustment factor undercompensated for inflation, whereas once the inflation rate started to fall in 1976, it overcompensated for inflation.

Despite its shortcomings, the indexing system for personal income taxes has saved individuals in all income classes from significant increases in tax burdens. This was true even in the first year the system was introduced, when the inflation adjustment factor was only 6.6 percent. The combined impact for various income groups on federal and provincial income taxes taken together is summarized in Table 3-2.

**TABLE 3-2. CANADA: TAX SAVINGS AS A CONSEQUENCE OF INDEXING, 1974**
**($Can.)**

| Income Level | Federal & Provincial Income Taxes | | Reduction in Taxes | |
|---|---|---|---|---|
| | Without Indexing | With Indexing | Absolute Amount | Percentage |
| 4,000 | 7 | 0 | 7 | 100.0 |
| 5,000 | 133 | 72 | 61 | 45.9 |
| 6,000 | 383 | 318 | 65 | 17.0 |
| 7,000 | 646 | 576 | 70 | 10.8 |
| 8,000 | 920 | 846 | 74 | 8.0 |
| 9,000 | 1,198 | 1,120 | 78 | 6.5 |
| 10,000 | 1,498 | 1,409 | 89 | 5.9 |
| 12,000 | 2,129 | 2,021 | 108 | 5.1 |
| 15,000 | 3,145 | 3,014 | 131 | 4.2 |
| 20,000 | 5,198 | 4,966 | 232 | 4.5 |
| 30,000 | 9,699 | 9,374 | 325 | 3.4 |
| 50,000 | 20,138 | 19,651 | 487 | 2.4 |

Note: These estimates are for an average married taxpayer with two dependents under the age of 16.
Source: Allan, Dodge and Poddar, "Indexing the Personal Income Tax: A Federal Perspective," *Canadian Tax Journal* (July/August 1974).

This shows large tax savings—in proportion to the without-adjustment tax burden—for lower income groups. As a result, for these groups the marginal tax rate was lower than it otherwise would have been once the indexing system was introduced. Thus, the work incentive was protected somewhat in these low income groups, despite the fact that the inflation adjustment factor was lagged.

## INDEXING WELFARE AND SOCIAL SECURITY PAYMENTS

The Canadian pension plan, the unemployment insurance fund, family and youth allowances, old age security and guaranteed income supplements, and veterans benefits are all indexed. For example, the Canadian pension plan, which is universal for those who have ever been employed, is indexed to the index of wages and salaries as far as contributions are concerned, and benefits are linked to the consumer price index. Because contributions have been depressed in the past—before they were indexed—there has been a catch-up period during which they have risen by 12.5 percent annually, but the plan calls for linking to the wages and salaries index in the long run.

In discussing the U.S. welfare system, it was noted that its partial linkage to the consumer price index could lead at times to a divergence between trends in wages and benefits that might be a disincentive to work. This is also true of the Canadian system, although generally it is not too significant an effect.

More serious has been the strain on federal government finances. In conjunction with the indexing of personal income taxes and the consequent foregone automatic rise in revenues, social security and welfare payment increases have contributed to the government deficit. Between 1971 and 1979, social security and welfare payments increased from $5.9 billion to $15.0 billion (that is, by $9.1 billion), largely on account of payments being indexed. The federal deficit was $10.31 billion. Of course, had welfare not been indexed, *ad hoc* adjustments would no doubt have been necessary; nonetheless, the inflationary rise in welfare payments has undoubtedly contributed to Canada's current fiscal difficulties.

## TREATMENT OF CAPITAL INCOME

There has been no systematic attempt to adjust automatically taxes on capital to inflation although the issue has been examined in professional circles in Canada. In 1975, the Joint Committee on Taxation of the Canadian Bar Association and the Canadian Institute of Chartered Accountants recommended that " . . . serious consideration should be given to the indexation of the adjusted cost base of capital properties and the sheltering of business earnings that represent purely inflationary gains." Bossons observed in the *Canadian Tax Journal* that there was a need to exclude from taxation purely nominal gains to assets.[1] He proposed deducting the real depreciation of the market value of the asset due to rises in the price level from the tax base, which amounts to deducting the inflation rate times the market value.

1 J. Bossons, "Indexing Financial Instruments for Inflation," *Canadian Tax Journal* (March/April 1974).

**TABLE 2-8. THE UNITED STATES: CHANGES IN CAPITAL INCOME TAX LIABILITIES CAUSED BY INFLATION, 1960–77 (Billions of dollars)**

| | Corporations | | | Shareholders | | | Totals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | With Net Debt Adjustment | | Without Net Debt Adjustment | |
| | Depreciation | FIFO/ LIFO | Net Debt | Dividends & Retained Earnings | Capital Gains | Corporate Creditors | Total Increase | Total Increase as a % of Corp. Income Taxes | Total Increase | Total Increase as a % of Corp. Income Taxes |
| 1960 | 3.2 | – 0.2 | – 0.4 | – 0.4 | 0.3 | 0.8 | 3.4 | 17.7 | 3.8 | 19.8 |
| 1970 | 4.8 | 2.5 | – 5.8 | – 0.2 | 2.3 | 7.3 | 10.9 | 39.9 | 16.7 | 61.1 |
| 1971 | 5.5 | 2.4 | – 4.1 | – 0.5 | 1.5 | 5.0 | 9.8 | 32.8 | 13.9 | 46.5 |
| 1972 | 6.0 | 3.2 | – 4.5 | – 0.8 | 1.6 | 5.4 | 9.9 | 29.5 | 14.4 | 42.9 |
| 1973 | 6.9 | 8.9 | – 12.9 | – 0.4 | 4.5 | 15.7 | 22.7 | 57.3 | 35.6 | 89.9 |
| 1974 | 10.3 | 19.4 | – 21.0 | – 1.3 | 7.2 | 25.0 | 40.6 | 95.1 | 61.6 | 144.3 |
| 1975 | 15.4 | 5.8 | – 14.5 | – 1.1 | 4.8 | 16.7 | 27.2 | 66.6 | 41.7 | 102.1 |
| 1976 | 17.3 | 6.8 | – 10.2 | – 2.2 | 3.6 | 11.9 | 27.2 | 56.5 | 37.4 | 77.7 |
| 1977 | 19.1 | 7.0 | – 15.1 | – 1.7 | 5.3 | 17.7 | 32.3 | 54.3 | 47.4 | 79.7 |

Source: M. Feldstein and L. Summers, "Inflation and the Taxation of Capital Income in the Corporate Sector," *National Tax Journal* (December 1979), Tables 1 and 4.

Attempts to correct for the impact of inflation on taxation of financial asset income have been modest. Since 1974, the year indexing was introduced, individuals have been permitted to exclude up to $1,000 of unearned income from Canadian sources. However, this provision does not offset the actual increase in taxes that is purely inflationary in its cause, and is insensitive to changes in inflation.

Equally, for corporate tax purposes, inventories must be accounted for by using FIFO. The result is an understatement of cost-of-goods sold and an overstatement of taxable income. The government recognizes this distortion and permits a deduction of 3 percent of inventory values from taxable income. Obviously, this may overcompensate firms who turn over their inventory rapidly and undercompensate those with long-lived inventories.

In sum, these adjustments have not been sufficient to shield capital income from the effects of inflation to the same extent as personal income.

## RELATIVE TAX BURDENS AND CAPITAL FORMATION

Since the introduction of indexing, the tax burden on capital income has increased quite sharply, while that on labor and personal income has increased modestly, if at all (see Table 3-3). Though five years is not a long period over which to observe a trend, it does appear that the federal taxes on the corporate sector have risen significantly faster than either personal income taxes or profits. Moreover, this increase only reflects the inflationary effect on taxes that results from understated depreciation and cost-of-goods sold. If the extra tax burden on nominal capital gains and on nominal returns on financial assets were also taken into account, the increase in the relative tax burden of capital would be more pronounced.

Over this period, investment in productive capital has not kept pace with GNP, while personal consumption has actually outpaced national product (see Table 3-4). Between 1974 and 1978, investment in new equipment, which is a good indication of investment for productive purposes, rose on average by 1.9 percent a year, while

**TABLE 3-3. CANADA: THE EFFECT OF FEDERAL TAX BURDENS, 1974-78 ($Can. Millions)**

| | Wages | Federal Personal Taxes | Fed. Personal Taxes as a % of Wages | Profits | Fed. Corp. Taxes | Fed. Corp. Taxes as a % of Profits |
|---|---|---|---|---|---|---|
| 1974 | 79,844 | 10,176 | 12.7 | 20,062 | 2439 | 12.2 |
| 1975 | 93,289 | 14,710 | 15.8 | 19,663 | 1997 | 10.2 |
| 1976 | 107,914 | 17,010 | 15.8 | 20,060 | 2145 | 10.7 |
| 1977 | 119,003 | 17,494 | 14.7 | 22,169 | 3517 | 15.9 |
| 1978 | 129,885 | 17,896 | 13.8 | 26,069 | 4521 | |
| Trend growth rate: 1974-78 | 12.9 | 13.9 | | 6.6 | 19.7 | 17.3 |

Sources: *Bank of Canada Review* (Ottawa, 1979), and IMF, *Government Finance Statistics Yearbook*, 1979.

**TABLE 3-4. CANADA: PERSONAL CONSUMPTION AND FIXED INVESTMENT IN EQUIPMENT, 1974-78 ($Can. Millions)**

| | Personal Consumption | | New Equipment | | GNP | |
|---|---|---|---|---|---|---|
| | Current Prices | Constant 1971 Prices | Current Prices | Constant 1971 Prices | Current Prices | Constant 1971 Prices |
| 1974 | 83,388 | 67,160 | 10,844 | 8,904 | 147,528 | 111,678 |
| 1975 | 96,995 | 70,645 | 12,798 | 9,209 | 165,343 | 113,005 |
| 1976 | 110,655 | 75,093 | 14,151 | 9,550 | 191,166 | 119,116 |
| 1977 | 122,425 | 77,272 | 15,125 | 9,521 | 209,256 | 121,949 |
| 1978 | 135,220 | 79,563 | 16,802 | 9,608 | 230,407 | 126,127 |
| Trend growth rate: 1974-78 | | 4.4 | | 1.9 | | 3.2 |

Source: *Bank of Canada Review* (Ottawa, 1979).

GNP increased by 3.2 percent a year. Personal consumption increased at an annual rate of 4.4 percent. Thus, there was a shift away from investment and toward consumption at a time when the incentive to save and invest was eroding because of the interaction of the tax code and inflation.

## IMPACT ON GOVERNMENT

Allan, Dodge and Poddar estimated that indexing personal income taxes would cost the federal government roughly 5 to 6 percent of budgetary revenues each year.[2] It was also estimated at that time that, whereas a 1 percent rise in GNP was formerly associated with a 1.6 percent rise in revenues, after indexing, the corresponding automatic rise in revenues would be only 1.2 percent.[3]

Because the indexation of the social security and welfare systems also strains the federal budget, public finances appear to have deteriorated more than expected (see Table 3-5). Deficits have risen to 20 percent of expenditures in the last three years, and net borrowing has greatly increased. (In 1979, net borrowing was held down by drawing on cash balances.) Before inflation accelerated in the 1970s, and before the introduction of indexing, the Canadian federal government budgets were close to being balanced; this is no longer the case.

The effect of a budget deficit of this magnitude—roughly four times as large as the U.S. deficit in relation to GNP—is, of course, to fuel inflation by overly stimulating demand. Equally serious is the likelihood that the deficit impedes the business community's efforts to cope with inflation. Such large net borrowing on Canadian capital markets as the federal government is now obliged to make may

2 Allan, Dodge and Poddar, "Indexing the Personal Income Tax: A Federal Perspective," *Candian Tax Journal* (July/August 1974).

3 Hall and Leonard, "Indexing the Personal Income Tax: An Ontario Perspective," *Canadian Tax Journal* (July/August 1974).

TABLE 3-5. CANADA: FEDERAL GOVERNMENT FINANCES, 1960-79
($Can. Billions)

| | Expenditure | Deficit | Net Borrowing | Deficit as a Percent of Expenditure | GNP | Expenditure as a Percent of GNP |
|---|---|---|---|---|---|---|
| 1960 | 5.96 | 0.25 | 0.18 | 4.2 | 39.65 | 15.0 |
| 1965 | 8.11 | 0.02 | – 0.07 | – 0.9 | 55.36 | 14.6 |
| 1970 | 15.99 | 1.00 | 1.81 | 6.3 | 85.68 | 18.7 |
| 1974 | 31.46 | 1.63 | 4.11 | 5.2 | 147.53 | 21.3 |
| 1975 | 37.47 | 6.28 | 6.04 | 16.8 | 165.43 | 22.7 |
| 1976 | 41.34 | 4.95 | 5.52 | 12.0 | 191.49 | 21.6 |
| 1977 | 46.70 | 9.08 | 10.02 | 19.4 | 210.13 | 22.2 |
| 1978 | 51.50 | 10.47 | 12.41 | 20.3 | 231.83 | 22.2 |
| 1979 | 54.14 | 10.31 | 6.36 | 19.0 | 258.88[e] | 20.9[e] |

e = estimates.
Source: *IFS Yearbook*, 1979, and monthly *IFS*, April 1980.

well crowd out some private investment. And, moreover, there must continue to be a suspicion among businesses that a federal cutback will be ordered soon to bring inflation under control. In other words, fiscal policy that permits a substantial deficit to persist increases business uncertainty and thereby inhibits investment.

## CONCLUSION

The Canadian indexing program deserves mixed reviews. The indexing of personal income taxes has most likely insulated individuals from the effect of inflation to a degree and therefore prevented inflation from becoming a disincentive to work. However, indexing social security and welfare programs as well as personal income taxes has put great strains on federal government budgets and contributed to substantial deficits in recent years. This may explain in part why little has been done to shield capital income from inflation/taxation interactions. These appear to have led to a fall in productive investment. Uncertainty about future federal fiscal policy may also have inhibited business investment decisions. On the whole, partial indexing has little to show against no indexing at all in terms of its effect on productivity and, ultimately, competitiveness.

# 4 The United Kingdom

## INTRODUCTION

The United Kingdom, like most other industrialized countries, has experienced sustained inflation over the last decade. While the rate of inflation has never approached the fastest rates experienced in some developing countries, it has in general been considerably higher than the rates in the United States and most of continental Europe. As it became apparent in the late 1960s and early '70s that this situation was not temporary, public discussion in Britain intensified about ways in which economic institutions might be insulated from the accompanying market distortions. However, as is the case in the United States, this discussion has resolved few issues and generated little systematic action.

Indexing for inflation is not widespread in the United Kingdom despite the high inflation rate. Virtually no private financial contracts are indexed, and the government does not offer indexed bonds. There is a commitment by the government to insulate the tax system from inflation, but in practice this insulation has been imperfect. The several reductions of personal income tax rates over the period have not fully compensated for the impact of inflation. Taxes on business profits have not allowed for inflation in valuing any business assets except inventories. In contrast, the government has indexed transfer payments. Social security, welfare and unemployment compensation are adjusted to maintain their purchasing power.[1]

This "partial" indexing has not helped the economy. Work incentives have been eroded, profits have suffered, savings and investment have fallen. Present government policy has done little to reduce market distortions induced by inflation, but has just shifted them from one market to another. In the long term, it may well be that the growth prospects for the British economy have suffered as a result. The main positions in the public debate on inflation and the reasons why the present situation is unsatisfactory are discussed below.

## THE TREATMENT OF BUSINESS PROFITS

Because of its early experience with rapid inflation, the United Kingdom was among the first Western industrialized nations seriously to consider adjusting business accounts to reflect inflation. In 1974, the Accountants Standards Steering Committee of the Institute of Chartered Accountants (ICA) issued a Statement of

1 More precisely, short-term benefits are indexed to the retail price index and long-term benefits are indexed to the price index or the wage level, whichever increases most over the year.

Standard Accounting Practice No. 7. This report recommended adjusting balance sheets to reflect changes in the general price level.

Partly to develop an official position on the Institute of Chartered Accountants' proposal, the government appointed a committee, known as the Sandilands Committee, to study the ramifications of adopting an inflation accounting system. The Committee recognized at the outset that some type of adjustment to existing accounting practices was necessary. Nearly one-half of reported profits in 1973 were because financial statements of businesses were based on historic costs.[2]

In September 1975, the Sandilands Committee issued its recommendations. While it agreed that some type of adjustment was necessary, it disagreed with the proposal of the ICA on two basic points of principle. First, the ICA proposal was to use a current purchasing power method of valuing assets and costs, adjusting historic costs for the change in the general price level. It was similar to the constant dollar method of the U.S. FASB 33, although units of general purchasing power rather than current currency would be used. The Sandilands Committee proposed instead to use a large number of indices to adjust the historic cost of assets to approximately their replacement value, or their value to the business. Second, the ICA proposal implied that net gains on monetary items on the balance sheet should be treated as part of profit; the Sandilands Committee took the opposite view. While the Committee's view, if applied, would have a somewhat more favorable impact for most manufacturing firms than the ICA view, it would be relatively unfavorable for financial companies, who thus have put forward substantial opposition to the Sandilands Committee report.[3]

Largely because professional opinion remained divided over the Sandilands Committee and ICA proposals, the government did not introduce measures that fully addressed these issues but instead adopted an interim, somewhat unsatisfactory scheme. In 1975, an allowance for inventory gains was introduced. Under this scheme, firms can deduct the excess in nominal inventory gains over 10 percent of the firms' gross profits. The 10 percent figure was a crude estimate of the average normal real gains in inventories. It was applied uniformly to all firms although in practice there was wide variance in real inventory gains among firms. In 1976, the figure was changed to 15 percent of profits net of depreciation.

The inventory provision has led to a sizable reduction in corporate tax liabilities. This provision may have been largely responsible for reversing the downward trend in real equity prices.[4] However, the provision is not adequate as a solution to the present situation.[5] Because of the *ad hoc* nature of the scheme, firms do not face a stable environment in which they can plan. That is, there is considerable uncertainty about how the government will adjust the provisions in the

2 A. Merrett, "Indexing Company Accounts," in T. Leisnar and M. King, eds., *Indexing for Inflation* (London: Heinemann, 1975), pp. 61–77.

3 J.A. Kay, "Inflation Accounting—A Review Article," *The Economic Journal* (June 1977), pp. 300–311.

4 L.G. Richardson, "Inflation and the Return on Securities," *Lloyd's Bank Review* (July 1976), pp. 19–25.

5 J.A. Kay and M. King, *The British Tax System* (Oxford University Press, 1978).

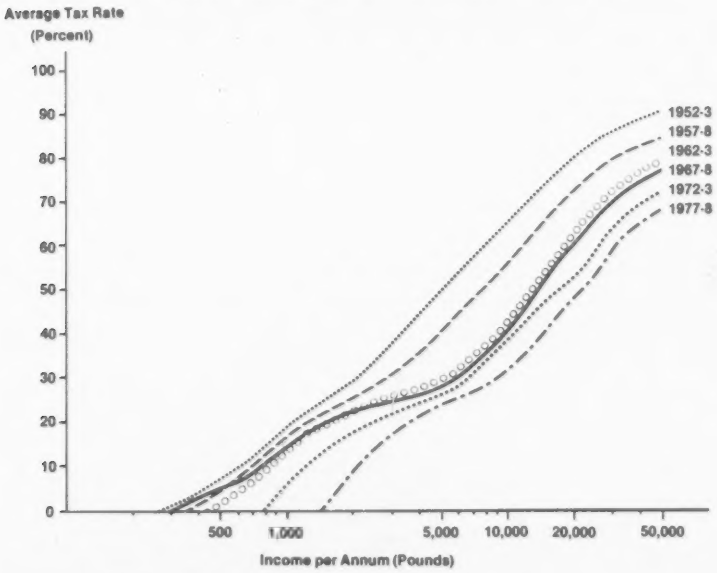
future since the government is not applying any systematic accounting principles. Thus, the government's present position almost certainly has an inhibiting effect on capital formation.

## INFLATION AND THE PERSONAL INCOME TAX

Inflation has had a major effect on the real tax revenue generated by the personal income tax. This has occurred because personal allowances were set in nominal terms and tax rates were applied to nominal incomes. The response of the British government has been to lower tax rates and to adjust personal allowances for changes in the general price level. However, this response has not fully compensated for the impact of inflation.

As Figure 4-1 illustrates, nominal personal income tax rates have steadily declined since 1952. However, the high inflation of the seventies had a considerable impact on money incomes. Because the rate schedule was highly progressive, real tax burdens increased for any given level of real income. As Figure 4-2 illustrates,

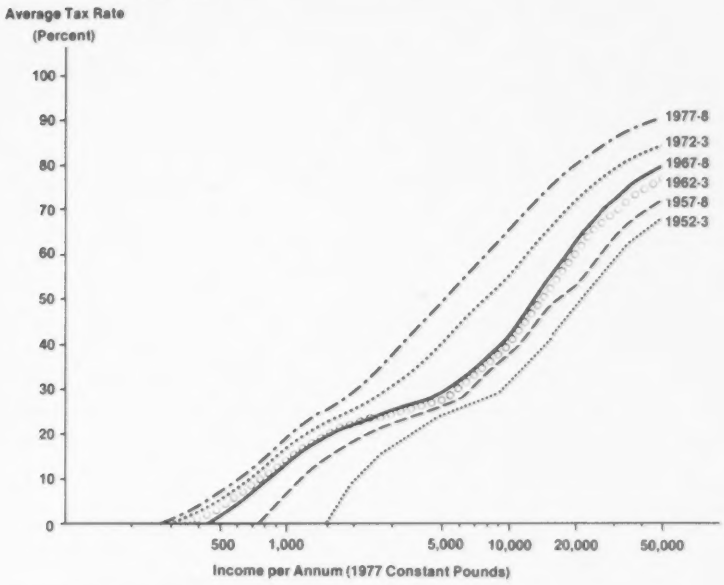
**FIGURE 4-1. THE UNITED KINGDOM: CHANGES IN INCOME TAX RATES AT GIVEN LEVELS OF NOMINAL INCOME, 1952-77***




*Taxes paid by a married man with no other allowances.

Source: J.A. Kay and M. King, *The British Tax System* (Oxford University Press, 1978), p. 45. Reproduced with permission.

**FIGURE 4-2. THE UNITED KINGDOM: CHANGES IN INCOME TAX RATES AT GIVEN LEVELS OF REAL INCOME, 1952-77***




*Taxes paid by a married man with no other allowances.

Source: Kay and King, *The British Tax System*, p. 46. Reproduced with permission.

the decline in nominal rates did not offset the impact of inflation. In fact, effective real tax rates steadily increased.

The treatment of personal allowances has followed the same pattern. The 1977 Finance Act indexed personal allowances with respect to the general price level, but left room for discretionary government action. As a result, the adjustment to inflation has not been perfect. Indeed, the real personal allowance fell from 1973 to 1976, as Table 4-1 indicates.

Inflation has had a significant effect on the structure of the British tax system. The major change has been the shift in emphasis from indirect to direct taxation. Many indirect taxes, such as the tax on gasoline, are fixed in nominal terms. As a result, inflation tends to reduce real indirect taxes at the same time it is increasing real direct taxes. For example, income taxes (including national insurance contributions) constituted 45 percent of total government receipts in 1965, while indirect taxes accounted for 29 percent. In 1975, the figures were 53 percent and 23 percent, respectively.

There has been considerable debate over whether the personal income tax should be completely indexed. If, for example, a Canadian-type indexation scheme had been in effect from 1968-69 to 1974-75, real tax revenues over the period

would have been 15 percent lower.[6] However, the government has generally resisted indexing the personal income tax on the grounds that, first, it would reduce the effectiveness of the tax as an automatic stabilizer and, second, it would inhibit discretionary fiscal policy. Furthermore, because transfer payments are fully indexed, a sizable fraction of government expenditures are locked-in in real terms. The government could not have indexed taxes in the early 1970s without significantly increasing deficits, which were already large.

Proponents of indexing have argued that such a system would ease inflationary pressures by reducing wage demands. Because inflation pushes workers into higher tax brackets, wages must increase faster than prices to keep real incomes constant. There is evidence which suggests that the failure to index the personal income tax has contributed significantly to the wage-price spiral in the United Kingdom. For some low income categories, unemployment benefits rose above post-tax earnings.

Part of the problem is that transfer payments are not simply protected against inflation, but are also guaranteed in real purchasing-power terms. A substantial fraction of the increase in retail prices between 1973 and 1976 was due to the increase in gasoline prices and in indirect business taxes. The use of the retail price index as the adjustment factor for many transfer payments meant they increased faster than factor costs or domestic prices. The adverse change in U.K. terms of trade over this period (more than indirect tax increases) led to a fall in real wages relative to transfer payments: those who worked lost ground to those who did not.

For this reason, the GDP deflator may be a more appropriate adjustment factor.[7] This index is a measure of domestic value added (at factor cost). It excludes indirect business taxes and the effects of relative changes in foreign prices. For example, an increase in the price of gasoline has a much smaller effect on the GDP than on the retail price index. During the first half of the decade, retail prices in the United Kingdom increased more rapidly than the prices of GDP.

**TABLE 4-1. THE UNITED KINGDOM: INFLATION AND THE PERSONAL ALLOWANCE, 1973–78 (Pounds)**

| | Single Personal Allowance | Stated Increase | Required Figure* | Actual Increase |
|---|---|---|---|---|
| 1973/74 | 595 | | 645 | 50 reduction |
| 1974/75 | 625 | 30 | 685 | 60 reduction |
| 1975/76 | 675 | 50 | 760 | 85 reduction |
| 1976/77 | 735 | 60 | 803 | 68 reduction |
| 1977/78 | 945 | 210 | 863 | 82 |

*Required figure is previous year's allowance adjusted for price changes.
Source: Kay and King, *The British Tax System*, p. 48.

6 R. Allen and D. Savage, "Indexing Personal Income Taxation," in Leisnar and King, *Indexing for Inflation*, pp. 41–61.

7 R. Jackman and K. Klapphol, "The Case for Indexing Wages and Salaries," in Leisnar and King, *Indexing for Inflation*, pp. 19–41.

## THE IMPACT ON GROWTH AND INVESTMENT

Since 1973, GNP growth has been modest in the United Kingdom (see Table 4–2). Investment in fixed capital assets fell from 19.1 percent of GNP in 1973 to 17.5 percent in 1979. At the same time, private consumption was roughly static in relation to GNP, and public consumption increased, although only modestly.

The shift in resources away from investment, though slight, must have contributed to the poor performance of the economy at large. But the low growth rate of GNP also reflected other factors, among them the disincentive to work that higher personal taxes brought with them and, perhaps, the greater uncertainty in the business environment that high inflation brought. Part of this uncertainty probably was concern about the management of the government budget.

The budgetary impact of inflation was indeed significant (see Table 4–3). Despite the fact that the personal income tax was not indexed, expenditures outgrew receipts after 1973. The deficit, which in the past had averaged less than 5 percent of expenditures and was 7 percent in 1972, rose to 19 percent of expenditures by 1975 and was still 13 percent in 1978. Two factors probably accounted for most of this increase in the deficit: first, the low rate of growth of the economy which depressed revenues and, second, the automatic increases in transfer payments.

Transfer payments increased significantly between 1973 and 1978 (see Table 4–4). Furthermore, the ratio of transfer payments to taxes increased, even though tax payments were not adjusted for inflation. In other words, the budgetary burden of indexing the social transfer payments system was increasing over this period. Perhaps partly for this reason, government investment as a percent of tax receipts fell. Having stood at 3.7 percent in 1973, it had dropped to only 2.6 percent by 1978. Not only was private investment falling but so was public.

**TABLE 4–3. THE UNITED KINGDOM: CONSOLIDATED CENTRAL GOVERNMENT REVENUE, EXPENDITURE AND DEFICIT, 1960–78 (£ Millions in Current Prices)**

| | Revenue | Expenditure | Deficit | Deficit as a Percent of Expenditure |
|---|---|---|---|---|
| 1960 | 7,184 | 7,491 | 307 | 4.1 |
| 1965 | 10,439 | 11,049 | 610 | 5.5 |
| 1970 | 18,206 | 17,536 | – 670 | – 3.8 |
| 1971 | 19,148 | 19,782 | 634 | 3.2 |
| 1972 | 20,805 | 22,401 | 1,596 | 7.1 |
| 1973 | 23,095 | 25,436 | 2,341 | 9.2 |
| 1974 | 29,230 | 32,721 | 3,491 | 10.7 |
| 1975 | 35,807 | 44,183 | 8,376 | 19.0 |
| 1976 | 43,764 | 50,550 | 6,786 | 13.4 |
| 1977 | 49,837 | 54,306 | 4,469 | 8.2 |
| 1978 | 54,142 | 62,519 | 8,377 | 13.4 |

Source: IMF, *International Finance Statistics Yearbook*, 1979.

**TABLE 4-4. THE UNITED KINGDOM: AN ANALYSIS OF GOVERNMENT RECEIPTS AND EXPENDITURE TRENDS, 1973-78**
**(£ Millions in current prices)**

| | Government Transfer Payments | Tax Receipts | Gov't Transfer Payments as a % of Tax Receipts | Gov't Investment | Gov't Investment as a % of Receipts |
|---|---|---|---|---|---|
| 1973 | 7,497 | 20,682 | 36.2 | 773 | 3.7 |
| 1974 | 10,619 | 26,180 | 40.6 | 972 | 3.7 |
| 1975 | 14,344 | 33,454 | 42.9 | 1,239 | 3.7 |
| 1976 | 16,396 | 39,592 | 41.4 | 1,414 | 3.6 |
| 1977 | 18,848 | 45,326 | 41.6 | 1,358 | 3.0 |
| 1978 | 22,163 | 49,802 | 44.5 | 1,314 | 2.6 |

Source: IMF, *Government Finance Statistics Yearbook*, 1979.

That private savings and investment fell was no doubt partly a function of fulfilling the desire to consume more of a stagnant national product. But, at the same time, real interest rates offered little or no incentive to save and the investment climate was indeed uncertain.

The substantial rise in business tax liabilities resulting from illusory inflationary increases in profits may have been a major catalyst of the stock market collapse of 1973-74.[8] The real price of equities fell 59 percent between December 1973 and December 1974. The energy crisis was undoubtedly responsible for part of the decline, but the interaction of inflation and taxes made a major contribution. Stock prices, reflecting the expected profitability of capital, fell as the inflation rate rose in 1973 and 1974 (see Table 4-5). The reversal of stock prices in 1975 can be explained in part by the introduction of the inventory allowance. However, real stock prices remained well below their previous levels.

**TABLE 4-5. THE UNITED KINGDOM: RETAIL PRICES AND THE INDUSTRIAL SHARE INDEX, 1971-76**

| | Percentage Change in Retail Prices | Financial Times (1935 = 100) Index of Industrial Ordinary Shares | |
|---|---|---|---|
| | | Level | % Change |
| 1971 | 9.4 | 386.2 | |
| 1972 | 7.3 | 503.8 | 30.4 |
| 1973 | 9.1 | 435.6 | – 13.6 |
| 1974 | 16.0 | 251.2 | – 42.3 |
| 1975 | 24.2 | 311.0 | 23.8 |
| 1976 | 16.5 | 380.0 | 22.2 |

Source: *Financial Times*, various issues.

8 Richardson, "Inflation and the Return on Securities."

## CONCLUSION

The impact of inflation on the British economy in the last decade has not been adequately managed by the present system of indexing. Indeed, social welfare transfers have been indexed to maintain their purchasing power in such a way that, in recent years, they have risen faster than wages, and among lower income groups have acted as a disincentive to work. These increased transfer payments have impacted adversely on the budget, contributing to an increase in the deficit—itself inflationary—and a decrease in public investment. Because personal income taxes have not been indexed, and *ad hoc* rate adjustments have not fully compensated for the impact of inflation, the real level of income tax has risen. The private surplus available to save has fallen, the incentive to save—the real interest rate—has been low, and private investment has been inhibited by uncertainty surrounding the government's treatment of business profits. While major statements have been made about how business should account for its activities in an inflationary environment—first by a private group, the Institute of Chartered Accountants, and then by a government appointed group, the Sandilands Committee—these have not settled all professional debate on the subject. Indeed, the opposite is the case; partly because the government feels the controversy continues to be real, they have adopted only the interim measure of an inventory adjustment allowance for tax purposes. At a time when the economy is stagnant, the depressed state of both public and private investment is especially troublesome. Given the inflationary environment of the last few years, it seems likely that the present "partial" system of indexing has contributed to this unfortunate situation.

**TABLE 4-2. THE UNITED KINGDOM: GNP, PRIVATE CONSUMPTION AND INVESTMENT AND GOVERNMENT EXPENDITURES, 1960-79 (£ Billions)**

| | GNP | | Private Consumption | | Government Consumption | | Fixed Investment | |
|---|---|---|---|---|---|---|---|---|
| | Current Prices | Constant 1975 Prices | Current Prices | As a % of GNP | Current Prices | As a % of GNP | Current Prices | As a % of GNP |
| 1960 | 25.73 | 71.46 | 16.94 | 65.8 | 4.21 | 16.4 | 4.19 | 16.3 |
| 1965 | 36.04 | 83.63 | 22.91 | 63.6 | 5.98 | 16.6 | 6.50 | 18.0 |
| 1970 | 51.53 | 94.39 | 31.66 | 61.4 | 8.96 | 17.4 | 9.45 | 18.3 |
| 1973 | 73.93 | 106.70 | 45.27 | 61.2 | 13.33 | 18.0 | 14.15 | 19.1 |
| 1974 | 83.62 | 104.97 | 52.00 | 62.2 | 16.56 | 19.8 | 16.92 | 20.2 |
| 1975 | 103.94 | 103.17 | 63.38 | 61.0 | 22.96 | 22.1 | 20.54 | 19.8 |
| 1976 | 123.80 | 106.84 | 73.46 | 59.3 | 26.57 | 21.5 | 23.60 | 19.1 |
| 1977 | 141.40 | 108.33 | 83.58 | 59.1 | 29.17 | 20.6 | 25.81 | 18.3 |
| 1978 | 161.17 | 111.91 | 95.74 | 59.4 | 32.62 | 20.2 | 29.25 | 18.1 |
| 1979[e] | 178.86 | 112.24 | 110.67 | 61.9 | 36.49 | 20.4 | 31.24 | 17.5 |

e = estimate.

Sources: *IFS Yearbook*, 1979, and monthly *IFS*, April 1980.

# Brazil 5

## INTRODUCTION

Brazil has adopted a comprehensive approach to indexing for inflation. While other countries have limited attention to the tax system, Brazil has encouraged the development of widespread indexing in private contracts. Only Chile has an indexing plan as comprehensive as Brazil's.

Indexing is an essential feature of the Brazilian economy. It has provided Brazil with a remarkable degree of insulation from sustained high inflation. It is fair to argue that Brazil's substantial growth over the last 15 years could not have been achieved in the absence of indexing. On the other hand, the indexing program has led to widespread government intervention in the allocation and distribution of resources. The Brazilian program is clearly not a substitute for an environment of stable prices.

## BACKGROUND

Indexing arose in Brazil as part of a general plan to stimulate growth in the economy. The government introduced indexing in 1964 during a period of rapid inflation combined with economic stagnation. In the period following World War II until 1962, Brazil's economic growth rate was among the highest for developing countries (see Table 5-1). An active federal government provided the demand stimulus, with deficit financing accounting for a large fraction of government expenditures. The income base could not generate a sufficient level of tax revenue, and government bonds were not very marketable. As a result, inflation accelerated, and on the eve of the indexing program the inflation rate was over 90 percent. In 1962, the government tried to slow down this rate with contractionary monetary and fiscal policies. But the net effect was a drastic reduction in real growth for the next several years while inflation continued to rise.

By the early 1960s, severe and chronic inflation was built into the system. In response to pressure from labor, the government adjusted the minimum wage schedule to past inflation rates. This policy led to feedback effects of inflation as firms marked up prices in response to wage increases.

The Brazilian government decided that, since their priority was growth, indexing was a more favorable alternative to continued contractionary monetary and fiscal policies. It was felt that indexing could ease the burden of inflation as federal policies designed to stimulate growth resumed. Inflation would then, it was hoped, be reduced gradually.

**TABLE 5-1. BRAZIL: REAL GROWTH, INFLATION, MONEY SUPPLY, AND THE MINIMUM WAGE, 1950–78**
**(Average Annual Percent)**

| | Wholesale Price Index | Real GNP | Money Supply | Nominal Minimum Wage |
|---|---|---|---|---|
| 1950–60 | 19.8 | 6.8 | 24.7 | 31.0 |
| 1960–70 | 42.0 | 6.0 | 42.0 | 48.5 |
| 1971 | 20.0 | 13.3 | 29.4 | 19.3 |
| 1972 | 18.6 | 11.7 | 40.0 | 16.9 |
| 1973 | 16.8 | 13.9 | 49.1 | 17.2 |
| 1974 | 29.1 | 9.8 | 33.6 | 29.8 |
| 1975 | 27.2 | 0.9 | 39.2 | 33.3 |
| 1976 | 43.4 | 13.3 | 38.5 | — |
| 1977 | 42.4 | 4.5 | 36.6 | — |
| 1978 | 37.6 | 6.0 | 41.0 | — |
| 1970–78 | 29.4 | 9.1 | 37.0 | — |

Sources: G. Jud, *Inflation and the Use of Indexing in Developing Countries* (New York: Praeger Publishers, 1978), and the *IFS Yearbook*, 1979.

## THE TREATMENT OF LABOR INCOME

The Brazilian government provides for direct annual adjustment to inflation of minimum wages and the wages of government employees. In addition, private collective wage negotiations are subject to government guidelines.

Three factors affect the government's formula for indexing wages (and for the wage indexing guidelines): past real wages, anticipated inflation and forecasted productivity changes. The plan works as follows. The government uses a weighted average of the real wage over the past two years and a forecast of worker productivity increases to estimate the target real wage for the upcoming year. This information is used with a forecast of inflation to compute the appropriate adjustment of the money wage.

The key point is that the formula allows the government considerable discretion since the adjustment of wages depends on several government forecasts. For example, in the first several years after the indexing plan was introduced, the government underestimated inflation, which led to a decline in the real minimum wage over this period (see Table 5-1). Since moderating the growth of money wages eases inflationary pressures, there is reason to believe that the persistent underestimates of inflation might have been a deliberate government strategy.

Brazil also annually adjusts personal income taxes for inflation. Since 1964, tax brackets have increased in rough proportion to increases in the cost of living index. However, as is the case with the formula for minimum wages, the government has a considerable amount of discretion. In 1973, for example, the government increased lower income brackets 26 percent and upper income brackets only 16 percent, while inflation was approximately 16 percent.

## CAPITAL INCOME

Prior to the introduction of indexing, inflation had created massive distortions in the capital market. The Brazilian government had fixed both loan and deposit rules. In 1969, there was a ceiling of 12 percent on the lending rate. Since the inflation rate was over 90 percent, there were no internal funds available for long-term investment. Due to techniques such as requiring compensating balances, banks were barely able to keep alive the market for short-term capital.

Controls on interest rates also had a perverse effect on the tax system. Since the interest penalty on overdue tax payments had a ceiling of 22 percent, and since the tax liability was unadjusted for inflation, there was a tremendous incentive for firms and households to postpone the payments. In the early 1960s, inflation was well above the ceiling interest rate, which meant that the real value of the unpaid tax liability would fall over time. The net effect was that the government was forced to rely even more heavily on money creation to finance expenditures.

Corporations were also hurt because financial accounts were not properly adjusted for inflation. The result was an increase in effective tax rates. In 1962, 43 percent of a firm's tax liabilities were due to reporting depreciation on an historical cost basis.

Brazil introduced inflation-indexed treasury bonds in 1964. The novel feature of the bonds was that recipients would receive a tax-free inflation premium based on the movement of the cost of living index. At first the public was reluctant to accept the bonds. (Indeed, the public had been unwilling to accept any type of government bond.) Then the government permitted banks to use them to fulfill legal reserve requirements. After several years the bonds became widely accepted.

As with the adjustment of wages, the inflation correction of government bonds is somewhat *ad hoc* and permits substantial government discretion. Initially, bond holders received an inflation premium based on the inflation rate of the previous quarter. This system was modified because, in an environment of accelerating inflation, the premium was insufficient to maintain the real value of the bond (since it depended on last quarter's inflation rate). The subsequent system based the premium in part on past inflation rates and in part on the forecasted future inflation. However, the public was not completely satisfied with this system since the government tended to underestimate inflation. The system was again modified to place a greater weight on historical inflation rates relative to forecasted inflation. The key point is that this indexing scheme is far from a neutral, automatic adjustment program, given the way the government has periodically altered the indexing formula.

Indexing spread to other markets. The introduction of index-linked mortgages stimulated growth of the housing market. Initially, all mortgages were adjusted to the movement of the wholesale price index. Later, special provisions were made for low income families. Mortgages for this group were linked to the minimum wage since it was not always the case that wages for this group kept pace with the wholesale price index.

Partly as a result of government encouragement, most private financial contracts adjust for inflation. The general method employed cannot be considered pure indexing. Indeed, private firms were unwilling to offer perfectly indexed bonds since they were uncertain whether their particular output prices would keep pace with in-

flation. Instead, a system termed "prefixed monetary correction" developed. This permitted creditors to exclude the component of earnings which is the inflation premium from taxable income. In addition to interest, the debtor pays the creditor a premium based on the expected inflation rate. (This allowed a more sophisticated application of the usury laws, which are still in effect and still fix ceiling interest rates. Thus, the monetary correction scheme effectively restricted the usury laws to apply only to real interest rates.) The creditor does not pay tax on the monetary correction, nor can the debtor deduct it. However, for tax purposes, the government officially computes the monetary correction based on its official estimate of inflation.

Corporation income taxes are also adjusted for inflation. Depreciation and inventory valuations are adjusted to movements in the wholesale price index. Capital gains are similarly adjusted.

## THE IMPACT OF INDEXING

Indexing was clearly a major factor in the resurgence of Brazilian economic growth (see Table 5–1). Capital formation obviously benefited because virtually all forms of saving, except demand deposits and cash, were subject to some type of adjustment for inflation. While indexing was an essential factor, it cannot alone or directly explain the high growth. Rather, indexing was an essential component of a program designed to stimulate capital accumulation. Because of indexing, the capital market, particularly the market for long-term capital, could exist and function smoothly. In addition, the Brazilian government encouraged its expansion with a set of incentive programs. Substantial tax deductions were available for private investment by both firms and households. For example, the Northeast Development Program permitted households to deduct 50 percent of their income tax liability in return for investing this amount in the northeast region. Further, indexing was one of several programs which encouraged an increase in the proportion of saving out of income. In addition, the government permitted those with savings accounts to deduct 6 percent of their balances against taxable income.

It should also be noted that the inflation rate fell dramatically in the decade following the introduction of indexing (see Table 5–1). The rate dropped from 91.9 percent in 1964 to a low of 16.8 percent in 1973. There appear to be two major factors accounting for this phenomenon. First, indexing eased cost-push pressures from labor by guaranteeing at least partial protection against inflation. Second, a rapid increase in productivity placed downward pressure on the rate of increase in output prices. The resurgence of inflation in 1974 and 1975 appears to have been part of a worldwide phenomenon rather than the product of particular Brazilian policies.

## CONCLUSION

The Brazilian experience provides some insights about the implications of indexing for inflation. The indexing program was clearly a major element in the general economic program which led to the restoration of high growth rates, and it

may have contributed to the reduction of inflation prior to 1975. It insulated the economy to a considerable degree from the damaging effects of rampant inflation.

Nonetheless, the Brazilian experience demonstrates that indexing is imperfect. Because of adjustment lags, difficulties in forecasting inflation and other factors, the indexing program did not perfectly correct for inflation. Rather, the program provided the government considerable discretion over the real allocation and distribution of resources. While this type of discretion might be desirable in a developing country with a cadre of competent economic technocrats dictating policy, it is not clear that it would be the most efficient approach for an industrialized country.

Although Brazil has been able to reduce its inflation rate with the aid of indexing, it has been unable to reduce it below 15 percent. Recently, inflation has soared again. While indexing eases cost-push pressures, it introduces feedback effects of inflation since most of the adjustment formulas depend on past inflation rates. This is one price that Brazilian indexing has probably involved.

# Conclusions for Policy 6

Between 1950 and 1970, the U.S. inflation rate was low in comparison with its trading partners at a time when inflation rates were generally much lower than today. Then, in the early 1970s, inflation accelerated in the United States, averaging between 7 and 9 percent for most of the decade. In the last year or so, inflation has again accelerated. The United Kingdom and Canada as well as the United States have failed to bring inflation under control. Japan, Germany and France have fared better. But, unlike Canada and the United Kingdom, the United States has not adopted policies that accommodate sustained inflation.

Aggregate saving and investment, and investment in producer durable equipment, as a percentage of GNP were surprisingly stable in the United States until quite recently when they began to fall sharply. However, the U.S. percentage—18 to 20 percent—is low by other countries' standards and is clearly related to the low U.S. rate of productivity growth. A low productivity growth rate may also be related to the disincentive impact of the tax system on personal incomes during an inflationary period. Certainly there have been much higher growth rates of productivity in Germany and France where individual and corporate income taxes are low in comparison to the United States and turnover taxes (VATs) are high. In the short run, productivity can increase if effective personal work incentives can be introduced. In the long run, productivity will improve if productive investment is stimulated. Any measures that can encourage these changes by reducing the distortionary impact of inflation deserve serious consideration.

**Indexing personal income taxes,** so that tax brackets rise with inflation, is one such measure. Through *ad hoc* adjustments, the United States has not permitted the average individual income tax rate to rise significantly because of inflation, but some of the marginal tax rates have increased. Indexing government transfers without indexing personal income tax brackets, the policy of successive governments in the United Kingdom, creates a disincentive to work at lower income levels. It is especially important that personal income tax brackets should be indexed if the transfer system is indexed and the tax structure is progressive. Quite apart from maintaining incentives associated with income differentials, indexing personal income taxes would remove one stimulus to accelerate wage inflation, whereby individuals wishing to maintain or improve their aftertax real income must claim beforetax increases larger than the inflation rate. Such a measure would also prevent the government from benefiting from real revenue increases due to the impact of inflation on the personal income tax structure.

**Introducing a value-added tax** as a partial substitute for income taxes might be a useful complementary measure. A VAT is likely to be inflationary in the short run—the recent U.K. experience with an increase in VATs would support this—but

in the medium term in an inflationary period, it can have a stabilizing influence on public finances since it is a broadly based *ad valorem* tax. More important, it may well encourage higher rates of saving and investment from disposable income since saving is more attractive with a VAT than an income tax.

Alternatively, it would be worthwhile considering a **personal expenditure tax** as a substitute for income taxes. Such a tax would both encourage badly needed saving and remove many of the inflation-created distortions of taxes on capital income relative to a VAT. This type of tax has the advantage of using the existing tax administration process and allowing graduation of rates as desired.

A program that protected labor income without protecting capital income from the distortionary interaction of inflation and taxation would be unbalanced and tend to retard incentives to save and invest. (The Canadian experience in this regard is noteworthy.) Presently, bond and equity income as well as corporation profits are all taxed more heavily as inflation increases.

Aftertax interest income to **bondholders** has been depressed in the 1970s, often leading to negative real interest rates. From the viewpoint of stemming inflation and of increasing savings and investment and ultimately productivity, **positive real interest rates would be desirable.** Experience in other countries as well as *a priori* reasoning support this contention.

**Some protection for bond markets might be desirable.** The Brazilian formula, whereby a tax credit is granted equal to the inflation rate multiplied by a bond's initial purchase value, is one possibility. Other closely equivalent formulas could no doubt be tailored to U.S. conditions. While it would be desirable to make an offsetting adjustment to borrowers' tax liabilities, so that they would be able to deduct only that part of interest payments over and above the rate of inflation, this might prove difficult as a practical matter.

Movements of stock markets in the last few years show that the aftertax return to equity holders is sensitive to inflation. This is so for at least two reasons. Inflation increases business uncertainty; it may actually depress expectations as well, but in any case a higher risk premium is sought, hence the reduction in real values of stock. However, the tax impact, the second reason, is more directly the result of government policy. Presently, the purely inflationary capital gain in equity value is taxed as though it reflected a real increase in value; a less distortionary policy would be to **exempt the inflationary capital gain of stock (and other assets) from taxation** in a manner comparable to that for bonds.

Equity rates of return do, of course, depend on aftertax corporate profits, and these too are subject to extra taxation because of inflation. The principal reason is that depreciation allowances are based on historic asset values that greatly understate replacement values when there is inflation. Thus, reported corporate profits overstate profitability and are taxed unduly heavily. The tax change that would go furthest toward restoring the pre-inflation situation would be to **base depreciation allowances on some estimate of replacement costs.** This does not necessarily imply a change in general accounting practices for financial reporting, but it might nonetheless be difficult to implement. **Rapidly accelerated depreciation allowances,** along the lines of the U.K. 100 percent first-year writeoff, might be a viable alternative.

Another policy that both the United Kingdom and Canada have tried for the purpose of ameliorating the impact of inflation on corporate tax liability is an

allowance on inventories. Such an allowance is intended to offset part or all of the gain due to inflation. On the whole, LIFO accounting, which is permitted for reporting and for tax purposes in the United States, is a preferable means of adjustment, since it automatically accommodates to changes in the inflation rate. Indeed, it may reduce the real corporate tax liability in periods of sustained inflation below what it would be in the absence of inflation, and it may thereby offset to some extent the adverse effect of the present depreciation allowance rules.

Both the existing allowance rule and the uncertainty about relative prices tend to favor short-term rather than long-term investments. This is unfortunate at the U.S.'s capital-intensive stage of development, since large, long-gestating investments, which realize considerable economies of scale, generally offer higher economic rates of return than smaller, short-term investments.

While the present depreciation allowance disincentive could be offset by a tax reform, the increase in relative price uncertainty caused by inflation is one of the strongest arguments in favor of limiting the pace of inflation itself. (That investment in Brazil seems to have burgeoned despite price uncertainty is a reflection of the confidence that rapid growth engenders. Clearly, such high growth is unattainable in the United States.) For this reason, no official encouragement should be given to indexing financial contracts. Where the practice is spreading without government intervention, as in labor contracts, it should be allowed to develop. In financial markets, it is not clear that the advantages of indexed bonds in terms of mobilizing capital outweigh the detrimental effects of institutionalizing inflation.

In summary, the analysis of the U.S.'s experience with inflation and of the policies used in other countries to accommodate inflation suggests that a number of tax reforms are worth serious consideration to maintain work incentives and to encourage saving and investment. The first would address short-term productivity and the second, long-term productivity. These reforms would in general eliminate real government revenue increases due to inflation and thereby contribute toward restraining the quasi-automatic expansion of government activity. While the price competitiveness of U.S. products may have benefited for the most part from the combined effect of inflation and exchange-rate changes in the past three decades, innovation, new investment and improved productivity are needed to sustain and enhance U.S. competitiveness in the future. The prospect of continued inflation and the most recent indications regarding productivity trends in the United States add a sense of urgency to these proposals.

Finally, it is well worth noting that such policies would not be necessary in an economy with little inflation. While reducing inflation permanently via sustained fiscal and monetary restraint would certainly be preferable to high inflation and policies designed to accommodate it, there has been little cause for optimism on this score. Recent monetary policy changes have been encouraging, on balance, but prudent fiscal policy has proved thus far to be difficult practically to implement. In the meantime, adaptive policies not only improve the prospects for productivity and competitiveness, but also can contribute significantly to a reduction in underlying inflation.

# Appendixes

## APPENDIX 1: Taxes, Inflation and Net Gains on Monetary Items

This appendix addresses the question of whether a net gain on monetary items should be included in income for tax purposes. It concludes that the difference between the anticipated and the actual rate of inflation divided by the force of the tax is the correct factor by which to multiply net debt outstanding to estimate the beforetax net gain on monetary items. Since the anticipated rate of inflation is not observable, the result casts some doubt on the appropriateness as a practical matter of including net gains on monetary items in taxable income.

The analysis is comparative static and multiperiod, and abstracts from business cycle considerations. It is based on a simple model of an income-earning entity that enjoys a real gross income of $Y_0$ indefinitely from time $t = 0$. At time $t = 0$, a consol of value $B_0$ is floated by the entity and, with no other debt or assets, this is its net debt position in all periods. Initially we consider a situation where there is no inflation and the interest rate is $i_0$. This is also the rate of time preference and an appropriate discount rate for future earnings streams. Taxes are levied at a rate $t_y$ on income after interest has been paid. Then at time zero, the net present value of present and future net income, $NPV_s$ — $s$, for stable price level — is given by:

$$NPV_s = \sum_{t=0}^{\infty} (Y_0 - i_0 B_0)(1 - t_y)(1 - i_0)^t + B_0$$

$$= \frac{Y_0}{i_0}(1 - t_y) - B_0(1 - t_y) + B_0$$

$$= \frac{Y_0}{i_0}(1 - t_y) + B_0 t_y. \qquad (1)$$

Suppose now that inflation is at a rate $\dot{p}$ which is perfectly anticipated. The real interest rate is unchanged, so the nominal interest rate $i = i_0 + \dot{p}$. The net gain on monetary items would now be $\dot{p}B_0$. Consider first the net present value of present and future net income when the net gain on monetary items is *not* included for tax purposes. Call this $NPV_w$ — $w$, for without the net monetary gain. Then $NPV_w$ is given by:

$$NPV_w = \sum_{t=0}^{\infty} (Y_0(1 + \dot{p})^t - iB_0)(1 - t_y)(1 - i)^t + B_0. \qquad (2)$$

(To maintain real gross income constant, nominal income at time $t$ must equal $Y_0(1 + \dot{p})^t$. The net income stream could be expressed in constant dollars by first

multiplying income at time $t$ by $(1 - \dot{p})^t$ and then discounting back by multiplying by $(1 - i_0)^t$; since $(1 - \dot{p})(1 - i_0) \doteq (1 - i)$, the composite discount factor in (2) can be considered as a shorthand.)

To simplify (2), note that

$$\sum_{t=0}^{\infty}((1 + \dot{p})(1 - i))^t = \sum_{t=0}^{\infty}(1 + \dot{p} - i - \dot{p}i)^t \doteq \frac{1}{i - \dot{p}} = \frac{1}{i_0}.$$

It follows that

$$NPV_w = Y_0(1 - t_y)\frac{1}{i_0} - iB_0(1 - t_y)\frac{1}{i} + B_0$$

$$= \frac{Y_0}{i_0}(1 - t_y) + B_0 t_y = NPV_s. \tag{3}$$

So, if our criterion for a "good" tax rule is that it should be unaffected by inflation, it appears that leaving out the net monetary gain from taxable income is a good rule when inflation is fully anticipated.

Consider next what including the net monetary gain for tax purposes would do when inflation is anticipated. Here, income in period $t$ for tax purposes is $Y_0(1 + \dot{p})^t - iB_0 + \dot{p}B_0$ and the tax levied would be $(Y_0(1 + \dot{p})^t - iB_0 + \dot{p}B_0)t_y$. Income after interest and income is then:

$$Y_0(1 + \dot{p})^t - iB_0 - (Y_0(1 + \dot{p})^t - iB_0 + \dot{p}B_0)t_y$$

$$= (Y_0(1 + \dot{p})^t - iB_0 + \dot{p}B_0)(1 - t_y) - \dot{p}B_0.$$

Thus, the net present value with net monetary gains taken into account, $NPV_{MC}$, is given by:

$$NPV_{MC} = \sum_{t=0}^{\infty}\{[Y_0(1 + \dot{p})^t - iB_0 + \dot{p}B_0](1 - t_y) - \dot{p}B_0\}(1 - i)^t + B_0$$

$$= \frac{Y_0}{i_0}(1 - t_y) + [(\dot{p} - i)B_0(1 - t_y) - \dot{p}B_0]\frac{1}{i} + B_0. \tag{4}$$

Thus, from (1):

$$NPV_{MC} - NPV_S = B_0\{[(\dot{p} - i)(1 - t_y) - \dot{p}]\frac{1}{i} + 1 - t_y\} = -\frac{\dot{p}B_0 t_y}{i}. \tag{5}$$

So, including the net monetary gain in net taxable income is a "bad" tax rule when inflation is perfectly anticipated.

Now we consider unanticipated inflation. Suppose we anticipate an inflation rate $\dot{p}'$ and therefore the rate on bonds is $i' = i_0 + \dot{p}'$. However, the actual inflation rate turns out to be $\dot{p}$. Then, the appropriate discount rate for nominal income streams remains $i = i_0 + \dot{p}$. And if real income is maintained, it must still equal $Y_t = Y_0(1 + \dot{p})^t$. Consider the effect of making no adjustment:

$$NPV_w = \sum_{t=0}^{\infty}(Y_0(1 + \dot{p})^t - i'B_0)(1 - t_y)(1 - i)^t + B_0. \tag{6}$$

This is the same formula as (2) except the interest paid on bonds is different. After some algebra, this reduces to:

$$NPV_w = \frac{Y_0}{i_0}(1 - t_y) + B_0 t_y + (\dot{p} - \dot{p}')B_0(1 - t_y)\frac{1}{i}. \tag{7}$$

Thus, $NPV_w$ is no longer equal to $NPV_s$; the difference is directly proportional to the error made in forecasting inflation.

Consider the effect of making the net gain in monetary items adjustment:

$$NPV_{MC} = \sum_{t=0}^{\infty} \{[Y_0(1 + \dot{p})^t - i'B_0 + \dot{p}B_0](1 - t_y) - \dot{p}B_0\}(1 - i)^t + B_0. \tag{8}$$

Once again, this formula is identical to its predecessor, in this case (4), except for the changed interest paid on bonds. With some manipulation, this reduces to:

$$NPV_{MC} = Y_0(1 - t_y)\frac{1}{i_0} + B_0 t_y + B_0(1 - t_y)(\dot{p} - \dot{p}')\frac{1}{i} - B_0 t_y \dot{p}\frac{1}{i}.$$

This will equal $NPV_s$ only if $\quad (1 - t_y)(\dot{p} - \dot{p}') = t_y\dot{p}$

or

$$\frac{t_y}{1 - t_y} = \frac{\dot{p} - \dot{p}'}{\dot{p}}. \tag{9}$$

Assuming $t_y \doteqdot 0.4$, this implies the net gain on monetary items adjustment will lead to a tax burden the same as would have been experienced in the absence of inflation, only if the market—as reflected in $i'$—underestimated inflation by a factor of three!

By what factor would it be necessary to multiply net debt outstanding in order to yield the same net present value of aftertax income as in the initial noninflationary situation? Since we know what aftertax net income stream discounted by the factor $(1 - i)$ yields this result when inflation is known (see (2)), we may concentrate on equating this to the aftertax income stream when inflation is uncertain. Let the factor in question be $\lambda$. Then, we require:

$$(Y_0(1 + \dot{p})^t - i'B_0 + \lambda B_0)(1 - t_y) - \lambda B_0$$

$$= (Y_0(1 + \dot{p})^t - iB_0)(1 - t_y) \qquad \text{for all } t. \tag{10}$$

Terms in $Y_0$ cancel, and we may divide throughout by $B_0$; then,

$$(-i' + \lambda)(1 - t_y) - \lambda = -i(1 - t_y)$$

implying

$$-\lambda t_y = (i' - i)(1 - t_y)$$

which in turn implies

$$\boxed{\lambda = (\dot{p} - \dot{p}') + (t_y/(1 - t_y)).} \tag{11}$$

Thus, the necessary factor by which to multiply net debt outstanding is the unanticipated component of inflation divided by the force of the income tax. As we would wish, if inflation is perfectly anticipated, $\lambda = 0$.

**To summarize the argument:** when there is inflation, we wish to add something to income after interest deductions, to reflect net gains on monetary items, to estimate taxable income. The aim is to leave the income earning entity as well off but no better off when there is this additional tax liability in an inflationary situation as it would be without inflation. Adding net gains on monetary items without any adjustment does not meet this criterion. Instead, we should add $(\frac{\lambda}{\dot{p}})$ times the net gains, where $\dot{p}$ is the rate of inflation actually experienced and $\lambda$ is given by (11). In particular, if inflation is correctly anticipated—i.e., $\dot{p} = \dot{p}'$—current practice is correct and adding *any* adjustment for net gains on monetary items is difficult to defend. Because $\lambda$ depends on the difference between anticipated and unanticipated inflation, the analysis casts some doubt on the practicality of making any adjustment of this kind.

A codicil is in order. The analysis was based on certain special assumptions. It would require a good deal more analysis to establish how general the positive assertions in the above summary really are. A schedule of debt over a number of years, with different maturities, imperfect expectations about income as well as inflation, progressive taxes, and a number of other realities should be taken into account. Nevertheless, the analysis does forcefully lead to a negative assertion: it will only be in very special circumstances that adding net gains from monetary items to beforetax income neutralizes the effect of inflation.

## APPENDIX 2: The Impact of LIFO on Profits

As is noted in the text, LIFO accounting for inventory when prices are rising leads to higher estimated costs of goods sold than FIFO, and thereby to lower reported profits and a lower corporate tax liability. However, it is not clear, *a priori*, whether the real tax liability under LIFO when there is inflation is greater than or less than the real tax liability with either FIFO or LIFO when there is no inflation. This appendix estimates the real corporate tax savings due to inflation when inventories are accounted for by using LIFO.

If there are positive tax savings $S$ due to LIFO accounting in an inflationary period, we would expect them to depend positively on the inflation rate $q$, the value of inventory at the beginning of the period $v_0$, and the tax rate $tr$. It is not immediately obvious whether $S$ would be positively or negatively related to the rate of inventory turnover $H$, or the rate of growth of inventory or sales $g$. (The formula to which the subsequent analysis leads is equation (4)).

In what follows, the subscript *"0"* denotes the value of a variable at the beginning of a period, *"1"* the value at the end and *"01"* the total value over the period. The absence of a subscript usually implies the variable is dependent on time $t$; this should be clear from the context.

It is assumed that the inventory is approximately homogenous and consists of $v$ units each worth $p$; thus $pv = V$. It is further assumed that inventory $v$ and sales $s$ grow at the same rate $g$, and this is also the rate of increase of the inventory purchase rate $h$. From these definitions, it follows that $\frac{v}{h} = H$, and $H$ is in fact constant. It also follows that $p = p_0e^{qt}$, $s = s_0e^{gt}$, $v = v_0e^{gt}$ and $h = h_0e^{gt}$. The inventory restocking identity is:

$$h_{01} = v_1 + s_{01} - v_0$$

or

$$\int_0^1 h\,dt = v_0 e^g + \int_0^1 s\,dt - v_0$$

$$\int_0^1 h_0 \quad e^{gt}\,dt = v_0(e^g - 1) + \int_0^1 s_0 e^{gt}\,dt$$

$$\frac{1}{g} \quad h_0(e^g - 1) = v_0(e^g - 1) + \frac{1}{g} \quad s_0(e^g - 1)$$

implying

$$h_0 = v_0 g + s_0. \tag{1}$$

Now, if the state of affairs is steady and $v$ is increasing, $s_0$ must be less than the new purchases over the period. In other words:

$$s_{01} = \int_L^1 h\,dt, \text{ for some } L \text{ where } 1 > L > 0.$$

Thus

$$s_{01} = \int_0^1 s\,dt = \int_L^1 h\,dt$$

$$s_0 \int_0^1 e^{gt}\,dt = h_0 \int_L^1 e^{gt}\,dt$$

$$s_0(e^g - 1) = h_0(e^g - e^{gL})$$

$$e^{gL} = (1 - \frac{s_0}{h_0})\, e^g \quad + \quad \frac{s_0}{h_0}. \tag{2}$$

Expanding $e^{gL}$ and $e^g$ implies:

$$1 + gL = (1 - \frac{s_0}{h_0})(1 + g) + \frac{s_0}{h_0} + u$$

where $u$ is second-order small in $(gL)^2$ and $g^2$. Thus, for all intents and purposes:

$$gL = (-\frac{s_0}{h_0} - \frac{s_0}{h_0} g + g) + \frac{s_0}{h_0} = g\,(1 - \frac{s_0}{h_0}).$$

But from (1): $1 - \frac{s_0}{h_0} = \frac{v_0 g}{h_0}$. Therefore, $L$ is given by:

$$L = \frac{v_0 g}{h_0} = gH. \tag{3}$$

Now, the cost of goods sold in a noninflationary environment, $C$, is given by:

$$C = \int_L^1 h\, p_0\,dt = \frac{h_0 p_0}{g}\,(e^g - e^{gL}).$$

The assumption here is that the same quantity of goods are sold whether or not there are price increases. The cost of goods sold when there is inflation $C_q$ is given by:

$$C_q = \int_L^1 hp\,dt = \frac{h_0 p_0}{g+q}\ (e^{g+q} - e^{(g+q)L}).$$

Thus, the profit savings $P = C_q - C$, and expanding $e^g$, $e^{gL}$, $e^{g+q}$ and $e^{(g+q)L}$ gives:

$$P = \frac{h_0 p_0}{g+q}\ (1 + (g+q) + \frac{(g+q)^2}{2} - \{1 + (g+q)L + \frac{(g+q)^2 L^2}{2}\})$$
$$- \frac{h_0 p_0}{g}(1 + g + \frac{g^2}{2} - \{1 + gL + \frac{g^2 L^2}{2}\}) + u'$$

where $u'$ is third-order small in $g$, $gL$, $g+q$, and $(g+q)L$. So, it follows after some algebraic simplification of the right-hand side that, approximately:

$$P = \frac{p_0 h_0 q}{2}\ (1 - L^2).$$

But:
$$L = gH \text{ and } \frac{v_0}{h_0} = H, \text{ so}$$

$$P = p_0 v_0\ (\frac{h_0}{v_0})\ \frac{q}{2}\ (1 - g^2H^2)$$
$$= \frac{V_0 q}{2H}\ (1 - g^2H^2).$$

Thus, the tax savings are given by:

$$S = tr\,\frac{V_0 q}{2H}\,(1 - g^2H^2). \tag{4}$$

Clearly, for $S > 0$ it is necessary for $L = gH < 1$, since $tr$, $V_0$, $q$ and $H$ are all positive. This appears to be a strong condition on $g$ and $H$, but in fact it is the requirement for the state of affairs to be sustained. In other words, if inflation and growth are sustained for a number of years, $L$ must average less than 1. Thus, it is reasonable to say $S$ is generally positive.

$S$ decreases with $g$ and with $H$. If the turnover rate is high, the cost of goods sold is large compared with inventory and the difference between LIFO and FIFO is small. Similarly, if growth is very rapid, the FIFO/LIFO difference is largely the difference in final inventory valuation at the beginning and at the end of the period, instead of being about twice that level in a no growth situation.

Thus, equation (4) corresponds to a sensible intuitive explanation of the relationship between $S$, $tr$, $V_0$, $q$, $H$, and $g$, but it goes further and precisely defines the magnitude of $S$ in an inflationary period. It would be possible to fit this to past U.S. data for the last few years. Such an exercise would involve an aggregation error since $g$, $H$ and $tr$ are not going to be the same for all firms. Nonetheless, the error may be small, and the exercise might be of interest for illustrative purposes. The formula might be more useful for predicting the impact on profit of future changes in the inflation rate.

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